

HORSE FLIES (DIPTERA: TABANIDAE) OF THE COLOMBIAN
DEPARTMENTS OF CHOCO, VALLE, AND CAUCA

By

RICHARD CHARLES WILKERSON

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Dedicated to my parents,
Warren and Helen Wilkerson

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By

Richard Charles Wilkerson

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A survey of the horse fly fauna of the Colombian departments of Choco, Valle, and Cauca was carried out during 1974 and 1975. Few surveys of this nature have been reported in Colombia.

Survey methods included flight traps and the use of human and livestock bait. An effort was made to collect in as many areas of accessible primary forest, in as many different Holdridge ecological zones, as possible. Collecting localities are indicated on ecological maps and a description of each zone is given in the text. This treatment will facilitate further collecting and provides a general statement about the ecology of the species found at each site.

Keys and descriptions or redescriptions of 158 species are presented. Thirty-five species, one subspecies, and one subgenus are described here for the first time. Figures of head characters of 39 species and of the wings of 81 species are given. A checklist of 226 Colombian species is included. In addition to the new descriptions, 19 new country records are noted.

INTRODUCTION

Surveys of the horse fly fauna of Colombia have been few. The only work involving the entire country is that of Bequaert and Renjifo (1946). They listed 129 species with localities and brief taxonomic and distributional notes. Sixty of the names used by them have been changed and the species list is now much more extensive.

In the area under consideration two studies have been carried out, one published and one unpublished. Lee et al. (1969) studied the biting arthropods, including the horse flies, in the Rio Raposo area, 40km south of Buenaventura in the department of Valle.¹ Their study lasted from 1962 to 1965 in habitats ranging from mangrove swamp on the coast to tropical rain forest 10km inland. Their capture methods included the use of human and livestock bait at ground level. Other collections, using human bait in the forest canopy, were especially valuable since these are the only long term canopy collections which have been made in this area.

The Atlantic-Pacific Interoceanic Canal Studies survey (see the "collecting localities" section for more detail) was carried out between April and Dec. 1967. One of the survey sites was in the department of Choco. They too utilized human bait at ground level

¹Departments, which are large political divisions in Colombia, are underlined throughout the text for ease of reference.

and in the canopy in addition to flight traps. A species list from this area, compiled by G. B. Fairchild was made available to me for this study.

In addition, Porter and Defoliart (pers. comm. 1976) carried out biting arthropod studies (1970-72) in the adjacent department of Antioquia. A list of the horse fly species present was kindly provided by Dr. C. H. Porter.

The three departments under consideration, Choco, Valle, and Cauca, have a total land area approximately 33% larger than Panama. The total number of horse fly species known at this time is similar in the two areas--about 160--but much more extensive collecting has been carried out in Panama. The entire United States, for example, has but 282 species (Philip 1965), and Europe only 166 (Chvala et al. 1972).

Fairchild's (1971) catalogue lists approximately 178 species (out of a total neotropical fauna of about 956) from Colombia. Extensive collecting by myself between Oct. 1972 and June 1976 in these three departments has shown that much remains to be done since 34 new species were found in that small part of the country alone.

The purpose of this work is to provide workers with a means to identify specimens in this area of Colombia. In addition, by using the references and descriptions it is my intention that any serious worker will be able to study in depth the species present and their known variation without time-consuming searches for references and specimens.

The classification system of Fairchild (1969, 1971) for the neotropical Tabanidae is followed throughout this paper. All three recognized subfamilies and five of the seven tribes are present

in the study area. Twenty-seven of the 52 neotropical genera are represented.

All keys are written for the identification of females. It is not practical to design keys for the males at this time since so many are unknown.

References provided with each species are not intended to be complete. I give only the original description plus those with figures, references, synonymies, and Colombian records. Fairchild's (1971) catalogue may be referred to in most cases if additional references are needed or if a name is found which is not listed here. The literature cited section contains only those references cited in the text.

Material examined includes collector unless that information was not given on the label. All specimens from Colombia collected from 1974 to 1976 were collected by me unless otherwise stated.

This research was made possible by financial and logistical support from several sources. Direct assistance during my stay in Cali, Colombia, was provided by Tulane University at the International Center for Medical Research. I would like to thank Dr. Paul Beaver, former director, and Dr. Tom Orihel, the present director, for their complete assistance during my stay. In Cali I wish to thank Dr. Antonio D'Alessandro for daily assistance which made my effort both efficient and fruitful. Dr. Joe Browne and Dr. Stephen Ayala contributed significantly to my work by their professional assistance and by easing my adaptation to Colombian culture.

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Dr. Alberto Figueroa (Facultad de Agronomia, Palmira), and Dr. G. B. Fairchild.

I am especially grateful to Dr. G. B. Fairchild for his always patient and enthusiastic help. He provided advice and a great deal of time in the preparation of this paper. In addition, many of the keys were written in large part by him, or are adaptations of his keys from other works.

Holotypes designated here are to be deposited in the Florida State Collection of Arthropods, Gainesville. Paratypes and the bulk of the specimens will be retained in my collection. A synoptic collection will be sent to the Universidad del Valle in care of Dr. Pablo Barreto.

STUDY AREA, GENERAL ECOLOGY, AND COLLECTING LOCALITIES

The departments of Choco, Valle, and Cauca are located on the Pacific coast of Colombia (Fig. 98). They have surface areas of 47,205, 21,245, and 30,495km² respectively, a total land area nearly equal to that of the state of Kentucky.

The habitats here are extremely varied, occurring from sea level to over 4000m. They range from some of the wettest localities on earth to near desert. There are two mountain chains in Southern Colombia, the western chain branches in Narino and Cauca to form the Central and Eastern Cordilleras. Choco has as its southeastern border the Western Cordillera. This range extends through Valle and Cauca. Valle and most of Cauca have as their eastern borders the Central Cordillera, though in the southern part of Cauca there is only one range. In Cauca the extreme boundary lies within the Amazon basin. This Amazonian fauna is quite different in many respects and is not treated here.

Species reported from both Panama and Antioquia, for purposes of this study, are assumed to be found in Choco also. The two collecting sites of Porter and Defoliart (pers. comm. 1976) are described below (p. 10). Reference is occasionally made in the text to 2 sites in the Intendencia (a political division of less dense population than a department) of Putumayo. These also are described below.

Ecological Zones

The Holdridge Life Zone system (Holdridge, 1967) is based on altitude, latitude, mean biotemperature (temperature converted to relate

to biological activity, here designated as °C), and annual precipitation. It is useful here because it gives a general description of any locality within a zone and it allows the reader to make assumptions about localities not yet collected.

The accompanying life zone maps (Figs. 99-101) were taken from Espinal and Montenegro (1963) who treat all of Colombia. Espinal (1968) later made a much more detailed map of the department of Valle. There are some modifications in the later map not reflected in the maps included here. Most notably, the Tropical Wet Forest zone on the coast is all Tropical Rain Forest and the area below Lago Calima is Tropical Moist Forest, not Tropical Wet Forest. For a complete explanation of the Holdridge system see Holdridge (1967).

The following are brief descriptions of those zones found in the departments treated here (Espinal, 1968).

Tropical Very Dry Forest. Temperature greater than 24°C. Average annual rainfall between 500 and 1000mm. Altitude less than 1000m.

Tropical Dry Forest. Temperature greater than 24°C. Rainfall between 1000 and 2000mm. Altitude less than 1000m. Primarily found in the Cauca River Valley.

Tropical Moist Forest. Temperature greater than 24°C. Rainfall between 2000 and 4000mm. Altitude less than 1000m. This zone below the dam at Lago Calima was extensively collected.

Tropical Wet Forest. Temperature greater than 24°C. Rainfall between 4000 and 8000mm. Altitude less than 1000m. Lower Anchicaya and the site on the Rio Zabaletas are in this zone.

Tropical Rain Forest. Temperature greater than 24°C. Rainfall greater than 8000mm. Altitude less than 1000m. Found all along the Pacific coast, at sites such as Guapi, Rio Raposo, and Ladrilleros.

Subtropical Dry Forest. Temperature between 17 and 24°C. Rainfall between 500 and 1000mm. Altitude from 1100 to 2000m.

Subtropical Wet Forest. Temperature between 17 and 24°C. Rainfall between 2000 and 4000mm. Altitude from 1100 to 1900m.

Subtropical Rain Forest. Temperature between 17 and 24°C. Rainfall greater than 4000mm. Altitude 900 to 1900m. The site above Santa Maria is in this zone.

Lower Montane Moist Forest. Temperature 12 to 17°C. Rainfall 1000 to 2000mm. Altitude from 1800 to 3000m.

Lower Montane Wet Forest. Temperature 12 to 17°C. Rainfall between 2000 and 4000mm. Altitude 1800 to 3000m. Penas Blancas and Pance CVC are in this zone.

Lower Montane Rain Forest. Temperature from 12 to 17°C. Rainfall greater than 4000mm. Altitude from 1800 to 2900m. A good representation of species was taken from Cerro de Munchique in this zone.

Montane Wet Forest. Temperature from 6 to 12°C. Rainfall 1000 to 2000mm. Altitude greater than 3000m.

Montane Rain Forest (Paramo). Temperature from 6 to 12°C. Rainfall greater than 2000mm. Altitude greater than 3000m. Parque de Purace is in this zone.

Subalpine Rain Forest (Paramo). Temperature from 3 to 6°C. Rainfall 500 to 2000mm.

Collecting Localities

The following are collecting sites used in this study or used in studies by others from which specimens and data were available. Minor collecting sites may be mentioned in the text only and reference to the Atlas Basico de Colombia or the geographical and political map of Colombia of 1972 (scale 1:500,000) is recommended. Both were published by the Instituto Geographico "Agustin Codazzi."

All sites discussed here in the departments of Choco, Valle, and Cauca appear as numbers in parentheses on the accompanying ecological maps (Figs. 86-88).

Department of Choco

The first three collecting sites below were used by the Atlantic-Pacific Interoceanic Canal Studies survey for human disease hazards in the northern Choco (Eldridge and Fairchild 1973, and Eldridge et al. 1973). More complete descriptions and maps are included in the above papers. D. G. Young is credited here for these collections.

Curiche (3). Located on the narrow Pacific coastal plain between Humbolt Bay and Serrania del Baudo in a Tropical Wet Forest. Altitude about 10m. Collections were made between April 1967 and Dec. 1967 in primary forest and cut-over areas near a mangrove swamp.

Alto Curiche (2). Located 3km inland from Curiche on the Serrania del Baudo, altitude 302m, also Tropical Wet Forest.

La Teresita (1). Located at the eastern edge of the Serrania del Baudo near the Rio Truando, altitude 35m. The area collected was disturbed forest in a transition zone between Tropical Wet Forest and Tropical Moist Forest.

Rio San Juan and Rio Baudo (4). A one week collecting trip was made to the area between the above rivers. The area is primary, mostly undisturbed, Tropical Rain Forest or Tropical Wet Forest.

Department of Antioquia

Providencia (Rio Anori Valley). Twenty-four km SW Zaragoza (7° 19' N; 75° 04' W). Altitude 500-700m in a Tropical Wet Forest. This and the following site are those of Porter and Defoliart (pers. comm. 1976). They carried out canopy and ground level captures using traps, animal bait, and human bait.

Caucasia region. Near Caucasia in northern Antioquia. Altitude 100-200m, in a Tropical Moist Forest zone. An area without primary forest, mostly cut-over secondary growth or under cultivation.

Department of Valle

Ladrilleros (5). Located 30km northwest of Buenaventura. Tropical Rain Forest or Tropical Wet Forest. A beach and jungle environment. No primary growth was found but collecting was done in areas where only the largest trees had been harvested. One collecting trip, Jan. 1975.

"Bajo Calima" (6). Ten km E, 32km N Buenaventura. Near Rio Calima and "San Isidro," a small village not on my maps. Tropical Rain Forest. A logging area with both cut-over and primary forest zones. Two collecting trips, both in Sept. 1975.

Twenty km N, 41km E Buenaventura (7). One collection in Nov. 1975. Altitude 140m, in a Tropical Rain Forest or a Tropical Wet Forest. An area of primary forest.

"Rio Bravo - Playa Rica" (8). Located approximately 15km below dam at Lago Calima on the Rio Azul near confluence with Rio Calima. Tropical Moist Forest (Espinal 1968) or Tropical Wet Forest (Espinal and Montenegro 1963). Altitude 325m. Numerous specimens were taken at all times of the year, most collections from human and livestock bait. An area of subsistence agriculture and primary forest.

Lago Calima (9). Approximately 8km below dam at Lago Calima. Altitude 1250m. Tropical Moist Forest (Espinal 1968). Numerous collections throughout the year mostly from livestock and human bait. An area of subsistence agriculture in primary forest, terrain quite mountainous.

Tenerife (10). Above town of Tenerife near Paramo de las Hermosas. Altitude approximately 2500-2800m. Lower Montane Wet Forest. Several short, rather fruitless trips. Area of nearly completely cut-over farmland.

Rio Raposo (11). Extensive collecting in mangrove swamp and primary forest 10km from the coast. See Lee et al. (1969) for details. Tropical Rain Forest.

Rio Zabaletas (12). Approximately 4km E town of Zabaletas. Five week-long trips July-Oct. 1975 using human bait and CO₂ baited flight traps. Tropical Rain Forest or Tropical Wet Forest. Area of heavy forest with larger trees removed.

Santa Maria (13). Five km above town of Santa Maria. Altitude approximately 2000-2500m. Subtropical Rain Forest. One visit to a fairly inaccessible area of primary forest with small farms produced only 2 specimens of *Philipotabanus tanypterus* n. sp.

Lower Anchicaya (14). At the site of the hydroelectric plant at Lower Anchicaya. Altitude 400m. Tropical Wet Forest. Nine week-long trips at all times of the year. Large area of primary forest maintained around dam.

Rio Digua (15). Fifteen to 20km W Queremal on the Rio Digua. Tropical Wet Forest. Not visited by me, various specimens from collection of W. Eberhard were from this locality.

Queremal (16). Four km W Queremal. Altitude 1130m. Subtropical Rain Forest. One trip in Feb. of 1976. An area of primary forest with scattered agriculture.

Pance CVC (17). Fifteen km W Cali at the CVC (Corporacion Autonoma Regional del Cauca) meteorological station at "Pico Loro." Altitude 1700m. Lower Montane Wet Forest, or Rain Forest. Area of half and half primary forest and pasture. Flight trap captures made throughout the year.

Penas Blancas (18). Ten km W Cali, also referred to as Pichinde, though that locality is several kilometers away and at a higher altitude. Altitude 1750m. Lower Montane Wet Forest. Specimens taken at all times of year, mostly from livestock. Area of primary forest and subsistence agriculture.

Cali (19). In urban and suburban Cali. This and the following four localities are all in the Cauca River Valley and are at approximately 1000m altitude. Tropical Dry Forest.

Palmira (20). Palmira area, 20km E Cali. Tropical Dry Forest.

Finca San Luis (21). Twenty-five km E Cali, in Municipio de Candelaria. Tropical Dry Forest. Collections taken at all times of the year from livestock and flight traps. Area of intense agriculture.

Department of Cauca

Finca Samaritana (22). Near Rio Cauca, Bocas del Palo, Municipio de Puerto Tejada. Tropical Dry Forest.

Finca Corredor (23). Near Caloto, 40km S Cali. Tropical Dry Forest.

Guapi (24). At various sites within 10km of Guapi. Tropical Rain Forest or Tropical Wet Forest. Two one-week trips, July 1975 and Feb. 1976. Most specimens captured using CO₂ baited flight traps, in or near mangrove swamps.

Silvia (25). In or near Silvia. Altitude about 2800m. Lower Montane Wet Forest. Area completely converted to agricultural use.

Cerro de Munchique (26). At and around communications tower. Lower Montane Rain Forest. Altitude 2450-2900m. Three week-long trips, two in Aug. 1973 and 1975, and one in Jan. 1976. Area of secondary growth, little primary vegetation remains.

Parque de Purace (27). Lago San Raphael 10km E of Purace. Altitude 3500m. Subalpine Rain Forest (Paramo) or Montane Rain Forest. Two successful trips in Feb. and March 1976. Area of primary vegetation.

Intendencia of Putumayo

Mocoa (28). Near Mocoa. Altitude 650m. Subtropical Wet Forest. One trip in May 1976. Primary forest near Mocoa.

Puerto Asis. In and around Puerto Asis. Tropical Wet Forest. Altitude 240m. Secondary vegetation and primary forest.

METHODS AND MATERIALS

Field

A large variety of collection techniques was used in this study. The most fruitful apparatus was the Gressitt Trap (Gressitt and Gressitt 1962) modified by Howard V. Weems of the Division of Plant Industry, Gainesville, Florida. It is a tent-like apparatus, made of nylon netting, open at the sides, with a center baffle. It is lowest in the middle (about 2m) and slants upward at both ends, funnelling the insects into collecting containers (at about 3m). It is approximately 4-5m long. These traps were used with or without a CO₂ attractant. Flies attracted to human collectors were referred to as "netted" on all labels.

Livestock (horses and cows) was used extensively as bait, especially at Lago Calima and Penas Blancas.

Light traps were sometimes useful for capturing males. A New Jersey light trap was operated at "Finca San Luis" for 18 months and occasionally at other sites such as Lower Anchicaya. CDC light traps (Sudia and Chamberlain 1962) used to collect mosquitoes, *Culicoides*, and Phlebotomine sand flies also attracted some male horse flies. Males were also taken while feeding at flowers.

Laboratory

Illustrations (Figs. 1-13) were all made using a Wild M5-31876 dissecting scope with a camera lucida. Figure 1A shows the scale of all frontal, antennal, and palpal drawings. All head drawings were made at half the above scale as indicated on Figure 1D.

Wing slides for the photographs (Figs. 14-97) were made by removing the wing, placing it in cellosolve (ethylene glycol) for 10 minutes, and then placing it directly into Canada balsam. Wing photos are not to scale. Wing length is given only in the case of new species. As a general rule, the wing is as long as or slightly shorter than total body length including the head. It may be estimated from the measurements included with each description.

All original descriptions are of holotypes, as are the drawings of the new species unless otherwise stated. My redescrptions are based primarily on Colombian specimens examined unless Colombian material was not available. Variation, if any, in specimens from other countries is noted in the discussion. The keys are written primarily using characters from Colombian specimens.

GENERAL MORPHOLOGY AND TERMINOLOGY

The following terms are used in the keys and descriptions. For a more detailed account of Tabanid morphology, see Barretto (1946), Bonhag (1949), Bromley (1926), or Cragg (1912).

Head (Fig. 102). The eyes of the females do not touch. In life they may be unicolorous, with 1 to several bands, or with a pattern of spots and stripes. Soon after death these disappear but may, at least partially, be recovered by placing them in a relaxing chamber or in boiling water for a short time. Male eyes are usually holoptic, touching at the midline. Often, males have 2 different sized facets. If there is a sharp border between the 2, they are said to be well demarcated; if there are 2 very different sized facets, they are well differentiated. Either males or females may have pilose eyes, meaning there are erect hairs, often visible only with correct lighting, among the facets.

The frons lies between the female eyes. The frons may bear an ocellar tubercle which is a raised or bare area at the top or vertex. The tubercle often bears 3 ocelli which may be distinct, or vestigial. Usually the frons is pollinose (bearing a dust-like material) and has shiny, usually swollen, median structures called calli. The frontal or basal callus is at the base of the frons and is often extended upward into a ridge, the median callus, which may or may not be connected to the basal callus (Fig. 8-C).

The frontal index, used throughout this work, is determined by measuring the height of the frons and dividing it by the width at the base. Frontal drawings presented here are a flattened image of a curved surface. Measurements of frons height taken from the drawings are therefore larger than measurements taken through a microscope. Frontal indices measured from the drawings, therefore, will be larger, i.e., they will indicate a slightly narrower frons than the numbers given in the text determined by direct measurement.

Below the frons is the subcallus, its lower border formed by the antennal insertions. Below the antennae extending to the proboscis is the frontoclypeus. It is bordered laterally by the genae, which are the lateral areas below the eyes. The frontoclypeus and anterior genae are often called the face. The hairs of the lower genae are collectively called the beard. On each side of the frontoclypeus is a small depression called a tentorial pit.

The antennae are comprised of 3 basic segments: the scape, pedicel, and flagellum. The flagellum is made up of no more than 8 distinct annuli, of which the basal 4 annuli may be fused and modified to form the basal plate, which bears a dorsal tooth or dorsal angle. This angle or tooth may be obtuse (Fig. 9A) or acute and quite long (Fig. 9G). The terminal annuli when a basal plate is present are referred to as the style which is composed of 2 to 4 annuli.

The proboscis is composed of a labium which encloses 2 mandibles, 2 maxillae, a hypopharynx, and a labrum. The proximal part of the labium is referred to as the theca; it bears a pair of labella distally.

The palpi are derived from the maxillae and are comprised of 2 segments, the second, or distal, segment often shows identifying characters and is the part referred to in keys and descriptions.

Thorax. Refer to Figures 89I and 89J for terms used here describing the dorsal and pleural areas of the thorax.

The wing veins and cells (Fig. 102) are after Curran (1934, p. 484). These names represent a combination of systems as explained by Curran (1934). In addition R_{2+3} and R_4 may bear the designations R_2 and R_{3+4} respectively after Shannon and Bromley (1924). The fork or fork of third vein is where veins R_4 and R_5 branch. If an appendix is present, it is a small extension at this juncture. The first and fourth posterior cells may be closed, open, or coarctate (narrowed). *Chrysops* species (Fig. 24) usually have a dark band running across the discal cell called the crossband and often another spot at the apex including part of the marginal cell, called the apical spot. The hyaline area between the crossband and apical spot is called the hyaline crescent.

At the base of the costal vein is a small plate called the basicosta (Fig. 102E, F) which may be bare or have few to numerous setae.

In this work I refer to the covering of hairs and scale-like hairs as vestiture. There is also pollinosity, mentioned above, and pruinosity which is a powdery substance which changes color with the changing incidence of light.

Incrassate, used with reference to the legs, means swollen. The hind legs may or may not have distal tibial spurs (Fig. 102) whose presence helps define the subfamilies Pangoniinae and Chrysopsinae.

Abdomen. The abdomen has 7 visible segments. Genitalic characters are not used here because the time-consuming nature of dissecting and growing is beyond the scope of this study. Genitalic differences are of proven value in classification above the generic level (Mackerras 1954).

BIOLOGY

A generalized account of the tabanid life cycle can be found in James and Harwood (1969). However, life cycles and behavior of Colombian horse flies are virtually unknown. The available biological information for each species is included in the discussion section accompanying the account of each species. Seasonal distributions, hosts, and biting records may be ascertained from the sections on material examined.

A recent review of the larval and pupal biology and taxonomy of neotropical horse flies (Goodwin and Murdoch 1974) includes only partial information on 43 of the nearly 1000 species known. Those Colombian species considered by Goodwin and Murdoch are mentioned in the discussion section accompanying each species and indicated on the Checklist of Colombian Tabanidae.

MEDICAL AND VETERINARY IMPORTANCE

The disease and pest problems associated with tabanids have long been known. This subject was recently reviewed by Krinsky (1976). On a worldwide basis, 31 viruses, bacteria, protozoa, and helminths have been isolated, experimentally transmitted, naturally transmitted, or suspected as having been transmitted by tabanids. Some of the most important of these diseases found in the neotropics include equine infectious anemia, anthrax, tularemia, anaplasmosis, and surra.

Little work has been carried out in Colombia regarding disease transmission.

Antonio Betancourt and I (unpublished 1975) dissected over 1000 horse flies, belonging to 7 species, from the Municipio de Puerto Tejada near the Cauca River (Cauca). We were investigating the possibility of tabanid transmission of *Trypanasoma vivax* in that area. No trypanosomes were found in this sample.

Lee et al. (1969) studying the blood-sucking arthropods in the Rio Raposo area near Buenaventura, inoculated 370 pools of 3090 tabanids (14 species) into mice without virus isolation.

Page (1972), investigating *Trypanasoma vivax* transmission in cattle in the Monteria area of Cordoba, found a 3.4% trypanosome infection rate in 7 species of horse flies. Two species, *Trypanosoma theileri* and *Crithidia* sp. were found.

CHECKLIST OF THE COLOMBIAN HORSE FLIES

Several sources already named were used to compile this checklist. They are Lee et al. (1969), Porter (pers. comm. 1976), D. G. Young (Atlantic-Pacific Interoceanic Canal Studies survey, species list from G. B. Fairchild), Bequaert and Renjifo (1946), and the species collected by me. To this was added species from Fairchild's (1971) catalogue with Colombian distributions. Some species in the catalogue were not listed specifically from Colombia but were included if, for instance, they were found in Panama and Venezuela. Disjunct distribution or subspecies are possible in this case but I assume, for purposes of this list, their eventual discovery.

Pangoniinae

- Esenbeckia* (*Esenbeckia*) *balteata* n. sp.
- Esenbeckia* (E.) *bella* Philip
- Esenbeckia* (E.) *diaphana* (Schiner)
- Esenbeckia* (E.) *gracilis* Krober
- Esenbeckia* (E.) *illota osormoi* Fairchild
- Esenbeckia* (E.) *insignis* Krober
- Esenbeckia* (E.) *minuscule* n. sp.
- Esenbeckia* (E.) *prasiniventris* (Macquart)
- Esenbeckia* (E.) *subvaria* (Walker)
- Esenbeckia* (E.) *testaceiventris* (Macquart)
- Esenbeckia* (E.) *tigrina* n. sp.
- Esenbeckia* (E.) *tinctipennis* Krober
- Esenbeckia* (E.) *translucens* (Macquart)
- Esenbeckia* (*Proboscoides*) *ecuadorensis chagresensis* Fairchild

* Larval or pupal record, refer to Goodwin and Murdoch (1974)

** No definite Colombian record

† New Colombian record

Fidena aureopygia Krober
Fidena auribarba (Enderlein)
Fidena eriomeroide (Lutz)
Fidena flavipennis Krober
Fidena flavipennis vallensis n. ssp.
Fidena ochrapogon n. sp.
Fidena rhinophora (Bellardi)
Fidena schildi (Hine)

Scione albifasciata (Macquart)
Scione aurulans ssp. *lurida* Wiedemann
Scione brevibeccus n. sp.
Scione cupreus n. sp.
**Scione distincta* (Schiner)
Scione equivexans n. sp.
Scione flavescens (Enderlein)
Scione incompleta (Macquart)
Scione maculipennis (Schiner)
Scione minor (Macquart)
Scione minuta Szilady
***Scione nigripes* (Krober)
Scione obscurefemorata Krober
Scione punctata Szilady
Scione rhinothrix n. sp.
Scione rufescens (Ricardo)
***Scione rufipes* (Krober)
Scione serratus n. sp.
Scione youngi n. sp.

Pityocera (Pityocera) festae Giglio-Tos
Pityocera (Elephella) cervus (Wiedemann)

Chrysopsinae

Chrysops auroguttatus Krober
†*Chrysops boliviensis* Krober
**Chrysops calogaster* Schiner
Chrysops chiriquensis Fairchild
***Chrysops ecuadorensis* Lutz
***Chrysops incisus* Macquart
Chrysops leucospilus Wiedemann
**Chrysops melaenus* Hine
Chrysops mexicanus Krober
Chrysops nexosus n. sp. Fairchild
Chrysops renjifo Bequaert
Chrysops reticulatus n. sp.
Chrysops soror Krober
Chrysops varians var. *tardus* Wiedemann
Chrysops varians Wiedemann
Chrysops variegatus (DeGeer)
Chrysops weberi Bequaert

Tabaninae

Dasybasis montium (Surcouf)

Dasybasis schineri (Krober)

Stenotabanus (*Stenotabanus*) *brunneus* n. sp.

Stenotabanus (*S.*) *chrysonotus* n. sp.

Stenotabanus (*S.*) *detersus* (Walker)

Stenotabanus (*S.*) *incipiens* (Walker)

Stenotabanus (*S.*) *luteolineatus* n. sp.

Stenotabanus (*S.*) *nigriculus* n. sp.

Stenotabanus (*S.*) *obscurus* Krober

†*Stenotabanus* (*S.*) *sordidatus* Fairchild

Stenotabanus (*Phorcotabanus*) *cinereus* (Wiedemann)

Stenotabanus (*Brachytabanus*) *longipennis* Krober

Stenotabanus (*Stilbops*) *roxannae* n. sp.

Himantostylus intermedius Lutz

†*Diachlorus anduzei* Stone

Diachlorus curvipes (Fabricius)

†*Diachlorus fuscistigma* Lutz

Diachlorus jobbinsi Fairchild

†*Diachlorus pechumani* Fairchild

Hemichrysops fascipennis Krober

Bolbodimyia bicolor Bigot

Bolbodimyia celeroides Stone

†*Bolbodimyia erythrocephala* (Bigot)

†*Bolbodimyia galindoi* Fairchild

Bolbodimyia nigra Stone

Bolbodimyia philipi Stone

Selasoma tibiale (Fabricius)

**Chlorotabanus inanis* (Fabricius)

**Chlorotabanus mexicanus* (Linnaeus)

Chlorotabanus fairchildi n. sp.

Phaeotabanus cajemensis (Fabricius)

Phaeotabanus fervens (Linnaeus)

†*Phaeotabanus nigriflavus* (Krober)

†*Phaeotabanus phaeopterus* Fairchild

Spilotabanus multiguttatus (Krober)

Spilotabanus triaurius n. sp.

Acanthocera marginalis Walker

- Dichelacera* (*Nothocanthocera*) *albomarginata* (Krober)
 ***Dichelacera* (N.) *trigonifera* (Schiner)
Dichelacera (*Orthostyllocerus*) *aurata* n. sp.
Dichelacera (*Dichelacera*) *cervicornis* (Fabricius)
Dichelacera (D.) *chocoensis* Fairchild and Philip
 ***Dichelacera* (D.) *damicornis* (Fabricius)
Dichelacera (D.) *fasciata* Walker
Dichelacera (D.) *hartmanni* Fairchild and Philip
Dichelacera (D.) *marginata* Macquart
Dichelacera (D.) *melanosoma* Hine
Dichelacera (D.) *regina* Fairchild
Dichelacera (D.) *scapularis* Macquart
Dichelacera (D.) *submarginata* Lutz
Dichelacera (D.) *villavoensis* Fairchild and Philip
Dichelacera (*Idiochelacera*) *subcallosa* Fairchild and Philip
Dichelacera (*Desmatochelacera*) *transposita* Walker

- Catachlorops* (*Catachlorops*) *alpus* n. sp.
Catachlorops (C.) *calopterus* (Schiner)
Catachlorops (C.) *fumipennis* Krober
 ***Catachlorops* (C.) *nigripalpis* (Macquart)
Catachlorops (*Psarochlorops*) *auripilis* (Philip)
Catachlorops (P.) *difficilis* (Krober)
Catachlorops (P.) *quadrimaculatus* (Macquart)
Catachlorops (P.) *siculus* n. sp.
Catachlorops (P.) *testaceus* (Macquart)
Catachlorops (*Amphichlorops*) *bogotanus* (Enderlein)
Catachlorops (A.) *flavissimus* (to be des.)
Catachlorops (A.) *vespertinus* (Bequaert)
 †*Catachlorops* (*Psolidia*) *fulmineus* (Hine)
Catachlorops (P.) *fulmineus* form *ocellatus* Enderlein
 †*Catachlorops* (P.) *umbratus* (Hine)

- ***Dasychela* *badia* (Krober)
Dasychela *limbativena* (Enderlein)
Dasychela *ocellus* (Walker)

- Dicladocera* *argentomacula* n. sp.
Dicladocera *basirufa* (Walker)
Dicladocera *beaveri* n. sp.
Dicladocera *calimaensis* n. sp.
 †*Dicladocera* *clarus* (Schiner)
Dicladocera *dalessandroi* n. sp.
Dicladocera *distomacula* n. sp.
Dicladocera *hirsuta* n. sp.
Dicladocera *leei* Fairchild n. sp.
Dicladocera *macula* (Macquart)
 †*Dicladocera* *minos* (Schiner)
Dicladocera *nigrocoerulea* (Rondani)
Dicladocera *pruinosa* n. sp.
Dicladocera *riveti* (Surcouf)
Dicladocera *rubiginipennis* (Macquart)
Dicladocera *submacula* (Walker)

- Stibasoma (Stibasoma) apicimacula* Fairchild
Stibasoma (S.) chlonostigma (Osten Sacken)
**Stibasoma (S.) flaviventre* (Macquart)
**Stibasoma (S.) fulvohirtum* (Wiedemann)
Stibasoma (S.) panamensis Curran
**Stibasoma (Rhabdotylus) venenata* (Osten Sacken)

- Cryptotylus chloroticus* (Philip and Fairchild)
**Cryptotylus unicolor* (Wiedemann)

- Philipotabanus (Mimotabanus) annectans* Fairchild
Philipotabanus (M.) fucosus Fairchild
Philipotabanus (M.) phalaropygus Fairchild
Philipotabanus (M.) plenus (Hine)
Philipotabanus (M.) porteri Fairchild
Philipotabanus (M.) tanypterus n. sp.
Philipotabanus (M.) vulpinus Fairchild
Philipotabanus (Melasmatabanus) criton (Krober)
Philipotabanus (M.) fascipennis (Macquart)
Philipotabanus (M.) keenani (Fairchild)
Philipotabanus (M.) nigripennis n. sp.
Philipotabanus (Philipotabanus) magnificus (Krober)
**Philipotabanus (P.) nigrinubilis* (Fairchild)
***Philipotabanus (P.) pallidetinctus* (Krober)
Philipotabanus (P.) pterographicus (Fairchild)
***Philipotabanus (P.) stigmatalis* (Krober)
Philipotabanus (P.) tenuifasciatus (Krober)

- Styponmisa bipuncta* n. sp.
Styponmisa captiroptera (Krober)
Styponmisa flavescens (Krober)
†*Styponmisa hypographa* (Krober)
†*Styponmisa jaculatrix* (Fairchild)
***Styponmisa lerida* (Fairchild)
Styponmisa maruccii (Fairchild)
†*Styponmisa modica* (Hine)
Styponmisa pequenensis (Fairchild)
Styponmisa serena (Krober)
Styponmisa simplex (Walker)

- Leucotabanus canithorax* Fairchild
**Leucotabanus exaestuans* (Linnaeus)
**Leucotabanus flavinotum* (Krober)

Pseudacanthocera brevicorne (Enderlein)

- **Lepiselaga crassipes* (Fabricius)
Lepiselaga colombiana Fairchild
**Poeciloderas quadripunctatus* (Fabricius)
Poeciloderas allusiosus n. sp.

- **Tabanus albocirculus* Hine
- Tabanus aniptus* Fairchild
- Tabanus antarcticus* Linnaeus
- Tabanus bigoti* Bellardi
- **Tabanus claripennis* (Bigot)
- Tabanus colombensis* Macquart
- Tabanus commixtus* Walker
- **Tabanus dorsiger* Wiedemann
- Tabanus eldridgei* Fairchild
- †*Tabanus fumomarginatus* Hine
- Tabanus glaucus* Wiedemann
- Tabanus guapiensis* n. sp.
- Tabanus hirtitibia* Walker
- Tabanus importunus* Wiedemann
- Tabanus lutzii* Kroeber
- Tabanus macquarti* Schiner
- **Tabanus nebulosus* DeGeer
- Tabanus nereus* Fairchild
- Tabanus olivaceiventris* Macquart
- Tabanus pellucidus* Fabricius
- Tabanus perplexus* Walker
- Tabanus peruvianus* Macquart
- †*Tabanus piceiventris* Rondani
- Tabanus praeteritus* Fairchild
- Tabanus pseudoculus* Fairchild
- **Tabanus pungens* Wiedemann
- Tabanus restrepoensis* Fairchild
- Tabanus rixator* Fairchild
- Tabanus rubripes* Macquart
- Tabanus sorbillans* Wiedemann
- Tabanus surifer* Fairchild
- Tabanus thiemana* Enderlein
- Tabanus trivittatus* Fabricius
- Tabanus unipunctatus* (Bigot)
- Tabanus unistriatus* Hine

TAXONOMIC TREATMENT

Key to the Subfamilies of Tabanidae¹

1. Ninth tergite undivided in both sexes. Style of ♂ genitalia simple, pointed, or bifid. Caudal ends of spermathecal ducts simple, without cup-like expansions. Third antennal segment generally of 7-8 annuli, rarely with a basal plate of fused annuli. Ocelli and hind tibial spurs present. Eyes unpatterned in life Pangoniinae
- 1'. Ninth tergite divided in both sexes. Third antennal segment of a basal plate and a 4 or fewer annulate style. 2
- 2(1'). Style of ♂ genitalia simple, pointed. Caudal ends of spermathecal ducts simple, without cup-like expansions. Ocelli present. Hind tibial spurs usually present, rarely apparently absent or difficult to see. Eyes frequently patterned with bands or spots of contrasting color in life Chrysopsinae
- 2'. Style of ♂ genitalia truncate. Caudal ends of spermathecal ducts with cup-like expansions. Functional ocelli absent, though vestiges frequently present. Hind tibial spurs absent. Eyes plain or with horizontal stripes, rarely otherwise Tabaninae

¹This and the following two keys adapted from Fairchild, 1969.

Key to the Tribes and Genera of Pangoniinae and Chrysopsinae

1. Ninth tergite undivided in both sexes. Style of male genitalia simple or bifid. Third antennal segment generally of 7-8 segments, rarely with a basal plate of fused annuli Pangoniinae 2
- 1'. Ninth tergite divided in both sexes. Style of male genitalia simple, pointed. Third antennal segment of a basal plate and a 4 or less annulate style. Chrysopsinae, Chrysopsini, *Chrysops* (p. 119)
- 2(1). Style of male genitalia bifid. Eyes bare. Vein R_4 nearly always with a strong appendix. Face not markedly conically produced, the proboscis rarely much longer than head height . . . Pangoniini, *Esenbeckia* (p. 40)
- 2'. Style of male genitalia simple, pointed. Eyes pilose. Vein R_4 often without an appendix. Face usually inflated, often strongly conically produced, the proboscis frequently much exceeding head height Scionini 3
- 3(2'). First posterior cell usually closed, rarely open; fourth posterior cell always open. 4
- 3'. First and fourth posterior cells closed *Scione* (p. 84)
- 4(3). Third antennal segment with projections or prominent hair tufts on one or more annuli. First posterior cell closed with a long stalk *Pityocera* (p. 115)
- 4'. Third antennal segment subulate, the annuli without projections or prominent hair tufts *Fidena* (p. 63)

Key to Tribes, Genera, and Subgenera of Tabaninae

1. Basicosta smoothly pollinose, without setae. If setae are present, sparse or numerous, and there are vestiges of ocelli, a strong tubercle at vertex, labella partly sclerotized, a long tooth on third antennal segment, wings strongly patterned, or other striking specializations, see couplet 25 Diachlorini 2
- 1'. Basicosta with setae as dense as on adjoining costa. Without vestiges of ocelli or sclerotizations on labella, and rarely with other striking specializations. Tabanini 34
- 2(1). With one or both of the following characters: Basal plate at third antennal segment with an acute dorsal spine or tooth; labella of proboscis compact and with at least some shiny sclerotized areas 3
- 2'. Without either of the above characters, the basal plate of most obtusely angled above and the labella wholly pollinose . .18
- 3(2). Basal plate of third antennal segment with at most an obtuse angle, 90° or more, never excessively long nor with first antennal segment cylindrical and elongate. Labella of proboscis partly or wholly sclerotized. 4
- 3'. Basal plate with a long or short spine or acute angle, or greatly elongate, both style and first antennal segment unusually long. Labella sclerotized or not 6
- 4(3). First antennal segment shiny and globose, moderately to markedly inflated. Subcallus inflated and shiny. Extreme apex of wing sharply hyaline. Vein 3 bent forward, 1st submarginal cell somewhat coarctate *Bolbodimyia* (p.193)

- 4'. First antennal segment normal, subcallus pollinose. Wing otherwise 5
- 5(4'). Frontal callus absent. Pale yellowish or greenish unicolorous stout flies with wings hyaline or with small discrete black spots *Chlorotabanus* (p.205)
- 5'. Frontal callus present, small and rounded, usually with a slender upper ridge-like extension. Wings generally with dark pattern, sometimes hyaline. *Phaeotabanus* (p.212)
- 6(3'). Frontal callus as wide as frons, or if not, frons widened below, callus rounded and protuberant and bare areas on face. Eyes usually with at least a median dark transverse stripe, generally with several green or purple stripes, rarely unicolorous. Slender species, the tibiae slender, abdomen never green. Antennae not unusually long, the first segment notably shorter than basal plate. Dorsal spine short to very long. Style not unusually hirsute, rarely longer than plate, slender. Abdomen slightly if at all constricted. Wings various, rarely unpatterned. Labella often entirely sclerotized.
. *Dichelacera* s.l. 7 (p.221)
- 6'. Frontal callus narrower than frons; if not, then triangular and extended upward in a ridge, the lower angles barely touching eyes, or tibiae incrassate or abdomen greenish. Eyes unicolorous or bicolored, very rarely striped 11
- 7(6). Labella of proboscis wholly sclerotized and shiny. Wings with a diagonal dark fascia from apex to fifth posterior cell. Eyes with one or more transverse bands except in *ochracea*.

- Scutellum nearly always darker than adjoining mesonotum; the latter usually transversely banded
. *Dichelacera* (*Dichelacera*) (p.221)
- 7'. Labella partly pollinose. Wings otherwise. Eyes banded or unicolorous. Scutellum often paler than mesonotum, the latter never transversely banded 8
- 8(7'). Frontoclypeus inflated and shiny, the genae bare, or at least with bare stripe. Antennal tooth short, not reaching end of basal plate. Wings with area anterior to vein R infuscated, or apical third of wing dusky, or wing largely black, rarely with vestiges of a diagonal dark fascia. Subcallus pollinose. Scutellum generally with some pale hairs, often contrastingly pale. All tibiae at least basally white. Eyes usually banded. *Dichelacera* (*Nothocanthocera*) (p.238)
- 8'. Frontoclypeus pollinose or partly bare, genae pollinose. Wings not as above. 9
- 9(8'). Center of frontoclypeus and subcallus bare and shiny. Wings yellowish tinted, with area beyond fork of third vein and apex of discal cell faintly dusky. Mesonotum striped, the scutellum black. Eyes unbanded
. *Dichelacera* (*Idiochelacera*) (p.240)
- 9'. Frontoclypeus and subcallus wholly pollinose. 10
- 10(9'). Wing with irregular dark discal patch, extended along costa to apex, and with an extension along R_4 . Vertex rather sunken, without vestiges of tubercle. Scutellum brown or pale haired. Abdomen with pale haired triangles on tergites

- 2 or 3 to 4. Eyes bicolored or unicolorous. Legs unicolorous or the tibiae darker than femora. *Dichelacera (Orthostyloceras)* (p.246)
- 10'. Wing black with hyaline apex and hyaline band from costa to hind margin covering ends of basal cells. Body black with white triangle on fourth abdominal tergite. Legs black, only fore tibiae bicolored. Eyes unicolorous. *Dichelacera (Desmatochelacera)* (p.243)
- 11(6'). Tibiae all slender. Tubercle at vertex generally distinct and prominent, rarely obsolete. Palpi slender to threadlike. Proboscis generally with small compact labella, wholly or partly sclerotized, rarely wholly membranous. Antennae slender, the dorsal spine slender, pointed, rarely shorter than basal plate. Frons usually narrow, the callus clavate or ridge like, rarely otherwise. Wings nearly always patterned, rarely lightly tinted, never wholly clear. . . . *Catachlorops* 12 (p.249)
- 11'. Tibiae inflated, or tubercle at vertex absent, or palpi inflated, or dorsal antennal spine clubbed or very short or frons broad 15
- 12(11). First posterior cell closed or strongly coarctate. Frons very narrow, the callus ridge like. Wings with dark pattern which leaves area around apices of basal cells or most of discal cell, and apex or oval spots in first R and third R clear or paler. Antennae with long slender tooth, its apex often recurved. Labella wholly sclerotized. Palpi very slender. . . . *Catachlorops (Psalidia)* (p.252)

- 12'. First posterior cell open; if somewhat coarctate, then wings otherwise. 13
- 13(12'). Wings with a dark discal patch which includes all of discal cell, the latter sometimes fenestrate, or wings wholly black, or black with hyaline apex, the basal cells hyaline or partly or wholly dark. Frontal callus often clavate. Labella often partly pollinose. Thorax at most faintly striped.
. *Catachlorops (Catachlorops)* (p.256)
- 13'. Wings not as above 14
- 14(13'). Wings with definite pattern of bands or spots. Pattern similar to *Psallidia*, but more reduced (Fig. 43).
. *Catachlorops (Psaroehlorops)* (p.259)
- 14'. Wings without definite pattern, yellow, smoky or veins brown margined. Slender species with partly sclerotized labella, slender palpi and slender antennae (Fig. 57).
. *Catachlorops (Amphichlorops)* (p.249)
- 15(11'). Palpi basally inflated. Proboscis short, heavy, labella wholly sclerotized. Stout species with proportionately short stout antennae 16
- 15'. Palpi long, slender, generally exceeding antennae. Proboscis long to very long, slender, the labella pollinose. Not stout chunky species, the antennae slender. Brown species with a dark wing pattern which leaves area around ends of basal cells and apex of wing hyaline or paler.
. *Dasycheila* (p.262)
- 16(15) Dorsal tooth on third antennal segment short, an acute angle to a short spine, seldom exceeding end of basal plate. Fore

- tibiae slender to moderately inflated, remaining tibiae slender. Wings hyaline or slightly smoky, or veins brown margined. Abdomen and appendages often greenish in life. Not bee-like species 17
- 16'. Dorsal tooth always exceeding end of basal plate, sometimes nearly reaching apex of style, often clubbed. Fore tibiae always incrassate, remaining tibiae generally also inflated. Wings various, never wholly hyaline or uniformly tinted, generally with black or contrasting pattern, often resembling bees *Stibasoma* (*Stibasoma*) (p.304)
- 17(16). Frontal callus reduced to a short narrow ridge, small streak, or virtually absent. Wings glass clear to faintly smoky, the costal cell yellowish. Yellow, greenish, or brown unicolorous species, the legs unicolorous, the body without contrasting hair patterns *Cryptotylus* (p.319)
- 17'. Frontal callus round or square, as wide as frons, extended above in a broad or narrow ridge. Wings yellowing or smoky, veins sometimes brown margined. Thorax brown, abdomen strongly greenish or yellowish, both body and legs with contrasting hair patterns *Stibasoma* (*Rhabdotylus*) (p.316)
- 18(2'). Discal cell of wing narrowed by anterior bending of vein M_3 . small blackish species with wings largely black to beyond discal cell, inflated shiny palpi, inflated tibiae, and elongate first antennal segment. *Lepiselaga* s.l. (p.375)
- 18'. Discal cell normal 19
- 19(18'). Wing basally black or heavily tinted to ends of basal cells, remainder hyaline. Whole face and entire body including

- legs, black and shiny. Palpi strongly inflated. Third antennal segment subcylindrical, without marked dorsal angle. *Himantostylus* (p.183)
- 19'. Wings otherwise. 20
- 20(19'). Mesopleuron and mesosternum darker than adjoining sclerites, the mesopleuron shiny pearly pollinose. Wings usually with dark markings, the apex often blackish. Eyes with characteristic pattern of green spots and stripes, resembling *Chrysops*. *Diachlorus* (p.186)
- 20'. Mesopleuron and mesosternum concolorous with adjoining sclerites, not pearly pollinose. Wings various. Eyes unicolorous or banded, but not as above 21
- 21(20'). Eyes bare with at least two transverse bands in life, light on dark, or dark on light, the light usually greenish, the dark purplish or blackish. Mostly small species with bare eyes, moderately broad frons with often a median dark-haired patch, and rounded or square callus generally as wide as frons. (If frons very narrow, callus ridge like and eyes unbanded, see *Styponmisa* couplet 33. *Stenotabanus* s.l. 22 (p.158)
- 21'. Eyes hairy, unicolorous. Basal callus broad, as wide as frons. Vertex without ocellar tubercle. *Dasybasis* (*Dasybasis*) (p.152)
- 22(21). Antennal style with basal 2 annuli partly fused, appearing 3 annulate. Frons very broad, the callus less than half width of frons *Stenotabanus* (*Brachytabanus*) (p.177)
- 22'. Antennal style normal, clearly 4 annulate. Frons and callus not as above 23

- 23(22'). Subcallus and face largely bare and shiny. Scutellum contrastingly pale haired 24
- 23'. At least face wholly pollinose
. *Stenotabanus (Stenotabanus)* (p.161)
- 24(23). Wings glass clear, the stigma yellow. Eyes with slender green lines forming two narrow transverse loops.
. *Stenotabanus (Stenochlorops)*
- 24'. Wings hyaline with a subapical costal brown patch. Eye with 2 iridescent dark blue stripes on a black background
. *Stenotabanus (subgen. nov.)* (p.179)
- 25(1). Basicosta with few to numerous setae, but seldom with setae as dense as on adjoining costa. Generally with one or more of the following characters: tubercle at vertex; bare areas on face; partly sclerotized labella of proboscis; long dorsal spine on plate of third antennal segment; first antennal segment subcylindrical; wings with extensive dark pattern; swollen tibiae 26
- 25'. Basicosta with setae as dense as on adjoining costa. Rarely with any of the above characters 34
- 25(25). All tibiae greatly inflated. Wings black to middle of discal cell, hyaline beyond. Palpi greatly inflated, shiny black. Subcallus and face shiny black. Third antennal segment with basal plate much longer than style, flattened, obtusely angled above. *Selasoma* (p.203)
- 26'. Tibiae not inflated. 27
- 27(26'). Face wholly subshiny, much produced. Wings black except for axillary area and apices of basal cells. Vertex with

- a well marked tubercle. Antennae slender, no strong tooth
on basal plate *Hemichrysops* (p.190)
- 27'. Face entirely pollinose. 28
- 28(27'). Basal plate with acute dorsal angle or long spine which may
reach beyond first annulus of style. Frons seldom over
4 times as high as wide. Frontal callus clavate, occasionally
as wide as frons at base, usually narrower. Palpi rather
long and stout, never very slender nor markedly inflated
basally. Eyes often pilose. Wings very rarely entirely
hyaline, generally with a dark discal patch below stigma
and usually with discal cell fenestrate. Basicosta rarely
bare *Dicladocera* (p.265)
- 28'. Basal plate with dorsal angle obtuse, or frons much
narrower 29
- 29(28'). Wings with extensive dark pattern not consisting of spots on
crossveins. If wings apparently unmarked, then thorax
prominently striped or frons exceedingly narrow and callus
threadlike 30
- 29'. Wings hyaline, tinted or with dark pattern primarily of dark
spots around crossveins. 32
- 30(29). Wings with an irregular dark pattern of variable extent
which always leaves clear areas surrounding all crossveins
and fork of third vein. Frons narrow, 7 or more times as
high as wide. Palpi very slender. Eyes unicolorous,
bronzy in life *Philipotabanus* (*Philipotabanus*) (p.323)
- 30'. Wings ranging from almost all black to hyaline with small
dark area below stigma, but crossveins not surrounded by
clear spots when within dark areas 31

- 31(30'). Slender species with frons 7 times as high as wide or narrower; palpi and antennae slender; proboscis considerably longer than palpi with small labella. Eyes bright green in life. *Philipotabanus (Melasmatabanus)* (p.325)
- 31'. Stouter species with frons not over 6 times as high as wide; palpi inflated, antennae broader; proboscis hardly longer than palpi, the labella large. Eyes green or brick red in life *Philipotabanus (Mimotabanus)* (p.331)
- 32(29'). All crossveins and ends of all longitudinal veins close to wing margin with large dark spots, sometimes confluent. Frons broad, not over 3 times as high as wide, the callus rounded, pointed above, as wide as frons. Vertex with distinct tubercle. Palpi slender, flattened, shorter than long proboscis. Thorax prominently striped. *Spilotabanus* (p.214)
- 32'. Wings never as extensively spotted, never with distinct spots on ends of longitudinal veins. Palpi not flattened, proboscis short. 33
- 33(32'). Wings hyaline or evenly tinted, the costal cell often darker, but never with spots on crossveins or apical clouds. Frontal callas clavate or ridge like. Abdomen black or brown, nearly always with transverse bands at least on fourth tergite, rarely otherwise. At least scutellum and often mesonotum pale pollinose and pale haired, generally contrasting with abdomen. Appendix on fork of third vein absent. Eyes un-banded, dark *Leucotabanus* (p.367)

- 33'. Wings with clouds on at least discal crossveins, often with apical infuscations. If entirely hyaline or tinted, then abdomen and thorax not as above. Often with appendix or fork of third vein. Eyes unbanded, green or bronze, or light with single dark stripe. Frontal callus variable. Rarely with basicosta bare. *Stypommisa* (p. 346)
- 34(1,25'). First antennal segment with dorsal anterior margin much produced, cap like. Eyes of female with 2 green bands, often bare or very sparsely pilose. Tubercle at vertex usually low and rounded, sometimes absent. Wings with crossveins often clouded, the first posterior cell generally at least coarctate, often closed and petiolate. *Poeciloderas* (p. 378)
- 34'. First antennal segment not as above 35
- 35(34'). Vertex with a strong tubercle, often bearing vestiges of ocelli. Eyes unicolorous, greenish black. Frontal callus clavate or ridge like. Abdomen plain or banded, never striped. At least scutellum and often mesonotum pale pollinose and pale haired, generally contrasting with abdomen (see also couplet 33) *Leucotabanus* (p. 367)
- 35'. Vertex with at most a small denuded spot. Eyes variously patterned or unicolorous, bare *Tabanus* (p. 387)

Genus *Esenbeckia* Rondani

Esenbeckia Rondani 1863, Arch. Zool. Mod. 3(1):83. Philip 1945, Rev. Brasil. Ent., 2:1-10, key.

Style of male genitalia is bifid. Frons with a ridge-like callus which may be bare or pollinose. Fairchild states

[they] do not have a produced conical frontoclypeus, the palpi project at nearly a right angle to the axis of the proboscis and are usually fairly long and curved. The proboscis is seldom over twice the height of the head, often less than head height, slender to quite heavy, the labella ranging from slender to broad, and either partly or wholly sclerotized. The antennae have the first two segments short, hardly longer than wide, the third of 8 annuli, the first few much wider than long, the terminal segments longer than wide, so that the whole segment tapers from a broad base to a slender and attenuated apex. The eyes are always bare and unicolorous, green, bronzy or blackish in life. The wings are clear, tinted, blackish or varicolored, and nearly always have the first posterior cell closed and with a long appendix at fork of third vein. Legs are slender and relatively long. (Unpublished, 1978)

Of the 76 named Neotropical species 16 are reported from Colombia and 9 from the study area.

Key to *Esenbeckia* species

1. Labella wholly sclerotized and forceps-like when viewed from above (Fig. 1I). Thorax blackish with whitish pleural hairs. The abdomen blackish with narrow fringes of white hairs on the apical borders of all sternites and tergites. Wings fumose. Legs entirely black.(*Proboscoides*) *ecuadoriensis chagresensis*
- 1'. Labella not forceps-like (Fig. 1D). Abdomen without narrow fringes of white hairs on the apical borders of all sternites and tergites. 2
- 2(1'). Abdomen pale green to dark green contrasting with brown to reddish thorax. Anterior 2 pairs of legs pale, the posterior generally darker. Wings lightly fumose*prasiniventris*

- 2'. Abdomen not as above, yellow to black, variously patterned. . . 3
- 3(2'). Without contrasting dark markings. Mainly yellowish to pale brown species 4
- 3'. Always with contrasting dark markings 5
- 4(3). Very small species, usually 10mm or less. Wings strongly smoky at base and costal border. First tergite contrastingly whitish. Hind femora dusky, contrasting with paler tibiae (Fig. IE-H) *minuscula* n. sp.
- 4'. Larger species, generally over 12mm. Wings more uniformly smoky. First tergite concolorous with second. Hind femora not darker than rest of legs. *illota osornoi*
- 5(3'). Wings distinctly bicolored (Fig. 14), basally yellowish, apically and along anal margin blackish brown. Abdomen banded. *tinctipennis*
- 5'. Wings unpatterned, wholly pale brown to blackish brown. Abdomen generally not banded. 6
- 6(5'). At least first 2 pairs of legs bicolored. Tergites 1-4 with prominent posterolateral hair tufts. Thorax and scutellum black, subshiny, thinly pale pollinose. 7
- 6'. Legs not bicolored, black or yellow. Tergites 2-5 without prominent posterolateral tufts. Thorax and scutellum brown to red, densely yellowish to reddish pollinose 8
- 7(6). Dorsum of abdomen dark reddish brown with obscure black mid-dorsal markings on tergites 1-4. Venter bright shiny mahogany red *testaceiventris*
- 7'. Dorsum of abdomen dull yellowish with a small black triangle on tergite 2, and dark transverse anterior bands on 3. Venter yellow with lateral black spots on first few tergites . . *tigrina* n. sp.

- 8(6'). Legs wholly pale orange brown. Beard, thoracic and pleural hairs rufous. First 2 abdominal tergites pale yellow without middorsal markings. Remainder of abdomen shiny dark brown to black *balteata* n. sp.
- 8'. Legs unicolorous blackish brown to black. Beard and pleural hairs pale gray to white, contrasting with thoracic dorsum. Second abdominal tergite with a faint to prominent dark narrow triangle or streak *translucens*

Esenbeckia (Esenbeckia) balteata n. sp.
(Fig. 2A-D)

A medium sized reddish brown species with first 2 abdominal segments translucent yellow above, beard and pleural hairs deep yellow, legs unicolorous yellowish brown and wings smoky brown.

Female. Length 17mm, of wing 19mm. Head characters as figured. Frontal index 2.0. Frons and subcallus yellowish brown pollinose, paler along borders; vestiture of a few very small dark hairs except those above ocelli which are longer and thicker. Callus yellowish brown. Eye color not noted. Genae pale yellow brown, frontoclypeus yellowish brown. Antennae pale brownish yellow, first 2 segments with pale yellowish brown pollinosity. Vestiture of segment 1 long sparse pale yellow hairs with a few ventral long black hairs. Hairs of segment 2 light brown above and a mixture of brown and black below. Palpi yellowish brown, black haired except for some orange yellow hairs on the first segment. Proboscis shiny brown sclerotized. Oculogenal hairs (Figs. 1D, 1E, 2D, 2H, found on the upper gena in the suture separating the gena from the frontoclypeus) short, sparse, and brown. Upper lateral parts of frontoclypeus with a few pale yellow hairs. Beard orange yellow except for some dark hairs between the base of the palpi and the eye.

Mesonotum and scutellum yellowish brown, yellowish brown pollinose, mesonotum slightly paler posteriorly and laterally. Vestiture of short yellowish brown hairs except for 2 small yellow tufts, one just above wing base, the other just behind wing base. Pleura and coxae with brown ground color showing through pale yellowish brown pollinosity. Vestiture of sparse long orange yellow hairs, densest below wing bases and just behind head. Procoxae clothed dorsally with long yellow orange hairs on basal two-thirds and with shorter dark brown hairs apically. Pro- and mesofemora light yellowish brown with a mixture of short sparse erect brown and yellow hairs, brown hairs predominating on the mesofemora. Metafemora light brown with short brown hairs. Pro- and mesotibiae and tarsi pale yellowish brown with short recumbant yellow hairs. Metatibia and tarsi light brown with short reddish yellow hairs. Halteres, knob brownish yellow, stem dusky. Wings smoky brown. First posterior cell petiolate, fourth coarctate, long appendix at fork of third vein.

Abdomen above with first 2 segments translucent pale yellow. Remaining segments dark reddish brown, segment 3 slightly lighter. Below segments 1, 2 and 3 translucent pale yellow, segment 3 with small lateral dark spots and 4 with lateral dark areas each occupying one-fourth the width of the segment. Remaining segments dark reddish brown. Vestiture primarily of short dark brown hairs most numerous on the terminal segments with pale hairs anteriorly and laterally on first segment, on the apical border of segment 2 below, and laterally on segments 2-4.

Male. Not known.

Distribution. Colombia (Valle).

Material examined. Colombia: Holotype, ♀, Valle, "Rio Bravo - Playa Rica," below dam Lago Calima, from livestock, 3 Feb. 1976, R. Wilkerson coll. Paratypes, as above, 1♀ 17 Jan. 1976; Valle, Lago Calima, 8km below dam, 1250m, from livestock, 2♀♀ 17 Jan. 1976, R. Wilkerson coll.

Discussion. The 3 paratypes are 13, 14 and 15mm in length and have frontal indices of 3.2, 3.3 and 3.3. The paratypes agree well with above description, except the third segment of the abdomen below is variable, one specimen has less coloration laterally, another has longer more diffuse lateral spots and a median dark triangle.

E. balteata is similar to *E. translucens* (Macquart) in general appearance since both have the first 2 abdominal segments translucent yellow. *Translucens* differs though by having a dark brown callus, pale gray beard, pale gray pollinose and gray haired pleura, and blackish legs. In addition the antennae, palpi, and proboscis of *translucens* are much stouter and reddish brown to black.

The name, *balteata*, meaning "belted," refers to the pale yellow anterior abdominal segments.

Esenbeckia (*Esenbeckia*) *illota osormoi* Fairchild

Esenbeckia illota osormoi Fairchild 1942, Ann. Ent. Soc. Amer., 35(2):196, pl. 11, fig. 11., ♀, Panama; 1971, Cat. Dipt. S. Amer., Fasc. 28:7.

A medium sized light yellow brown fly with pale yellow or brown vestiture throughout, unicolorous light brown legs, and pale smoky wings.

Female. Length 11-14mm (N=10, \bar{x} =12.5mm). Frontal index 4.2-5.8 (\bar{x} =4.7). Frons, subcallus, genae and frontoclypeus yellowish brown pollinose. Callus light brown, slender, tapering above and below, not reaching subcallus or ocelli. Eyes yellowish bronze in life. First 2 antennal segments light yellow, the third light orange yellow. Palpi light yellow brown, rather slender, outer aspect bare except for short black hairs on borders. Oculogenal hairs quite sparse or lacking. Beard of pale yellow hairs. Proboscis slender, shiny brown sclerotized, slightly longer than head is high.

Mesonotum light yellowish brown with thin light yellow and light brown setae. Pleura light yellow with pale hairs. Legs light yellowish brown with pale hairs. Wings nearly hyaline with a pale brown tint.

Abdomen variable, first 2 segments translucent, light yellow, remainder light yellow to brown with sparse to heavy yellowish brown pollinosity. Vestiture variable with short light yellow to brown hairs above, yellowish brown hairs below.

Male. Males are similar in color, the upper eye facets are larger but there is no sharp line separating them from the smaller facets below. Male palpi are slender, nearly threadlike.

Distribution. Fairchild (1942a) divided *E. illota* (Williston) into a number of poorly marked subspecies. The nominate form is known from southern Mexico to Honduras. *E. illota osornoi* from Costa Rica to Colombia (Cundinamarca, Meta, Santander Sur); other subspecies occur east of the Andes.

Material examined. Panama, 12⁰⁰~~77~~, 30⁰⁰~~38~~. Colombia: Amazonas; 17km W of Leticia, flight trap, 2⁰⁰~~77~~ 25 July 1973, Wilkerson and Young coll.

Discussion. Fairchild (unpublished, 1978) reports this to be a nocturnal and crepuscular species that shows preference for localities near rivers and swamps. Although not reported from northwestern Colombia, Bequaert and Renjifo (1946) saw specimens from Cundinamarca; Meta, Restrepo; and a paratype from Santander, Rio Negro. Fairchild (1942a) lists one paratype from Meta, Restrepo.

Two specimens collected at Leticia (Amazonas) may be *E. illota guianense* Fairchild but show little difference from *illota*. Since the taxonomic problems involved in this group are unresolved I will consider them to be *osornoi* for purposes of this paper.

Esenbeckia (Esenbeckia) minuscula n. sp.
(Fig. 1E-H)

A small yellowish brown species with slender palpi and proboscis, unicolorous light yellowish brown legs, smoky brown wings and abdominal segment 1 translucent, whitish.

Female. Length 8mm, of wing 10mm. Head characters as figured. Frontal index 4.3. Frons, subcallus, genae, and frontoclypeus brownish yellow pollinose. Callus light brown. Vestiture of a few very small brown hairs on upper half and a small clump of thick short hairs above ocelli. Eye color not noted. First 2 antennal segments light yellow with dark brown hairs, third segment light brownish yellow. Palpi brownish yellow with dark brown hairs. Proboscis slightly longer than head is high, slender, shiny dark brown sclerotized. Oculogenal hairs very sparse, light yellow. Beard sparse and light yellow except for a few dark hairs between the bases of the palpi and the eye.

Mesonotum and scutellum light yellowish brown in ground color, slightly darker laterally, along sutures, down the midline and

posteriorally, both covered with some light yellow pollinosity. Vestiture of short light yellow hairs, longer and more numerous laterally and posteriorly. Pleura light yellow pollinose below wing bases changing to brown beneath. Vestiture of sparse pale yellow hairs, longer and more numerous below wing base. Coxae brown with sparse light yellow pollinosity. Coxal vestiture long, yellow hairs predominating basally, long dark brown hairs predominating apically. Profemora light yellowish brown with short light yellow hairs, mesofemora yellowish brown with short light brown hairs above, and sparse dark brown hairs below, metafemora brown with hairs as mesofemora. Pro- and mesotibiae and tarsi light yellow with light yellow hairs. Metatibiae light brownish yellow with light yellow and a few brown hairs. Metatarsi yellowish brown with light brown hairs. Halteres light yellow. Wings nearly hyaline with a pale brown tint; costal margin and base of wing darker.

Abdomen with first segment translucent, whitish, pale haired. Remaining segments pale yellowish brown with pale yellow pollinosity, vestiture a mixture of short brown and a few brownish yellow hairs.

Distribution. Colombia (Valle).

Material examined. Colombia: Holotype, ♀, Valle, Rio Frio, La Carmelita, 13 June 1942, J. Renjifo coll. Paratype, ♀, same data as above.

Discussion. Paratype is as holotype, length 8mm, frontal index 3.9, denuded area around callus slightly larger. Specimen lacks terminal segments of both antennae.

E. minusculus is similar to *E. illota osornoi* Fairchild, with which it may be sympatric, but has a contrastingly pale first abdominal

tergite which *osormoi* does not, has dusky hind femora, has a darker wing base and costal margin, and paler halteres. It much resembles *E. illota illota*, but is hardly half the size of that species and has darkened, not pale hind femora.

Esenbeckia (Esenbeckia) prasiniventris (Macquart)

Pangonia prasiniventris Macquart 1845, Mem. Soc. Sci. Lille (1846), p. 161, pl. 111, fig. 9., ♀, Colombia

Esenbeckia prasiniventris: Fairchild 1942, Ann. Ent. Soc. Amer., 35:197-198, full refs.

A medium sized fly with a pale brown thorax, light to dark green abdomen and yellow prothoracic and mesothoracic legs and dark brown metathoracic legs.

Female. Length 11-15mm (N=10, \bar{x} =13.3mm). Frontal index 3.7-5.4 (\bar{x} =4.3). Frons and subcallus yellow pollinose. Callus dark brown, tapering gradually above, not touching subcallus below. Genae and frontoclypeus sparsely grayish pollinose. Oculogenal hairs pale and sparse. Antennae and palpi yellow. Palpi slightly pointed, outer aspects with hairs on the borders only. Eyes bright bluish green in life. Proboscis rather slender, as long as head is high, shiny sclerotized. Beard and pleural hairs variable, white, gray or orange.

Mesonotum pale greenish brown with many short light yellow hairs. Pleura pale gray pollinose. Legs as above. Wings pale smoky brown.

Abdominal color variable ranging from pale yellowish green to blackish green. Vestiture is of short dark brown hairs above, short dark brown and pale hairs below.

Male. Males are paler overall, have eyes with equal sized facets throughout and short porrect palpi.

Distribution. Guatamala to Brazil, Trinidad. Colombia
(Cundinamarca, Magdalena).

Material examined. Panama, 34^{♀♀}, 7♂♂.

Discussion. No examples of this species were taken during the course of this study nor has it been reported in Valle, Choco, or Antioquia. Beuquaert and Renjifo (1946) saw specimens from Cundinamarca, Bogota, and Magdalena, Rio Frio, Agua Dulce, and San Lorenzo Mts.

Esenbeckia (Esenbeckia) testaceiventris (Macquart)
(Fig. 2E-H)

Pangonia testaceiventris Macquart 1848, Mem. Soc. Roy. des Sci., de l'Agr. et des Arts Lille 1847(2):169 (also separately published as Supplement III:9), ♀, Quito.

Esenbeckia testaceiventris: Kroeber 1932, Rev. Entom., Rio de Janeiro, 2:68, figs. 15, 16.

Pangonia umbra Walker 1850, Insecta Saundersiana, Diptera 1:19.

Esenbeckia sexmaculata Enderlein 1925, Mitt. Zool. Mus. Berlin, 11(2):288.

Esenbeckia (Esenbeckia) testaceiventris: Fairchild 1971, Cat. S. Amer. Dipt. Fasc. 28:9, synonymy.

A large robust dark reddish brown fly with a pale yellow beard, bicolored yellowish brown and black legs, smoky brown wings, and abdomen with large black middorsal markings and lateral white or pale yellow hair patches.

Female. Length 16-19mm (N=6, \bar{x} =17mm). Frontal index (3 specimens from western Colombia), 3.1-3.3 (\bar{x} =3.2), and (3 specimens from eastern

Colombia) 3.5-4.3 (\bar{x} =4.0). Frons divergent below, 1.1-1.4 (\bar{x} =1.24) wider than vertex. Head structures as figured. Frons dark orange brown pollinose with sparse slender black hairs. Callus blackish brown. Tubercle at vertex densely long haired, pollinose, bearing 3 small and doubtfully functional ocelli. Subcallus dark yellowish brown pollinose. Genae and frontoclypeus with the black ground color showing through the sparse yellow pollinosity. Oculogenal hairs dense, long, pale yellow, as is beard. First antennal segment black, dark gray pollinose above, yellow pollinose below with corresponding black and yellow hairs. Second segment dark gray pollinose with black hairs. Third segment dark brown, slightly darker toward tip. Palpi brown, black haired. Outer aspect concave, mostly bare, inner aspect slightly convex with a few short black hairs over its entire surface. Proboscis slightly longer than head height, black and entirely shiny sclerotized.

Mesonotum and scutellum dark blackish brown, thinly pollinose, faintly lighter around sutures, clothed with sparse vestiture mainly of blackish hairs, paler above wing bases and on pronotal lobes. All hairs longer and more numerous posteriorly and laterally. Pleura light yellowish gray pollinose. Vestiture of numerous long yellow hairs mixed with a few black hairs on the mesoanepisternum. Pro- and mesocoxae as pleura, metacoxae blackish gray pollinose, black haired. Femora blackish gray, brownish yellow toward the apex, with rather long mixed yellowish and black hairs. Pro- and mesotibiae brownish yellow clothed with very short mainly pale hairs as are the tarsi. Metatibiae and tarsi black with longer outstanding hairs. Metatarsi black above, reddish below. Halteres cream colored, stem dusky. Base of costa deeply grooved. Wings smoky brown. First posterior cell

petiolate, fourth posterior cell slightly coarctate. Appendix at fork of third vein.

Abdomen broad, somewhat flattened, integument shiny except for pollinose first segment laterally. Color of integument dorsally intense deep reddish brown. Tergite 1 black. Tergites 2-4 deep reddish brown with broad irregular inverted black triangles, the triangle on 2 broadly reaching its posterior margin, the triangles on 3 and 4 only half as wide as segment but with thin faint black lines reaching their posterior margins. Tergites 3 and 4 with lateral black areas and 4 with a broad black apical margin. Remaining tergites black. Abdomen below paler reddish brown with small lateral black spots on sternites 2-4. Remaining sternites black. The vestiture above is of short black hairs and becomes denser and longer posteriorly, laterally segments 2-4 bear small but prominent tufts of silvery white hairs. Beneath the vestiture is somewhat longer and denser than dorsally.

Male. Not known.

Distribution. Colombia (Valle, Cundinamarca, Meta), Ecuador, Venezuela.

Material examined. Colombia: Meta; Villavicencio, 3♂♂ Sept. 1940; Valle; Penas Blancas, 1750m, from bait horse, 1♀ 29 April 1975, 1♂ 9 June 1975; Lago Calima, from livestock, 1♂ 22 Aug. 1975.

Discussion. The above description is primarily of the specimens from Penas Blancas. The example from Lago Calima has broader palpi, lacks the black lateral spots on the abdomen below, has a narrower black triangle on tergite 2, and the triangle on 3 reaches the apical margin.

The specimens from west of the Andes (Penas Blancas, Lago Calima) are somewhat different from a homotype (compared to *Pangonia testaceiventris*, *P. umbra*, and *Esenbeckia sexmaculata*) and the 2 other examples from Meta in eastern Colombia. The eastern specimens have shorter more rounded palpi, a somewhat shorter less stout proboscis, the apical third of the pro- and mesofemora yellowish brown, instead of only the extreme apex, and instead of wholly black the apex of the metafemora and all of the metatibiae and metatarsi are yellowish brown.

Further study may show these two to represent subspecies or even separate species.

Esenbeckia (Esenbeckia) tigrina n. sp.
(Fig. 1A-D)

A large robust fly with bicolorous yellow and black legs, a dark yellowish brown mesonotum, smoky brown wings, and abdomen with the first two segments clear yellow, the third yellow and dark reddish brown, the remainder dark reddish brown.

Female. Length 17mm, of wing 18mm. Frontal index 3.9, convergent above, 0.73 as wide at top as base. Frons, palpi and antennae as figured. Frons dark yellow pollinose, dark brownish yellow along sides and below callus. Tubercle raised, dark brownish yellow pollinose with 3 apparently functional ocelli. Vestiture of very short erect yellow hairs, a small group of medium length black hairs at the vertex. Callus brownish yellow. Callus and frons swollen except for slight depression below callus and above subcallus. Eyes bare, green in life. Subcallus dark brown mesially, dark yellow pollinose laterally and around antennal bases. Genae and frontoclypeus grayish

yellow pollinose. A row of yellow oculogenal hairs present. Beard yellow. Antennal segments 1 and 2 pale grayish yellow pollinose. First segment bare above and dark blackish brown anteriorally. Third segment pale reddish brown basally, becoming dusky apically. Antennal hairs black except for yellow hairs on ventral half of first segment. Palpi pale reddish brown, pale yellow pruinose. Apical two-thirds flattened, slightly concave and nearly denuded on the outside surface. Inner aspects similar but not concave and with short black hairs. Proboscis slender, nearly completely sclerotized, shiny, and as long as head is high.

Mesonotum and scutellum black in ground color, yellow pollinose. Vestiture of many slender light brown and yellow hairs, longer and more numerous laterally, posteriorly on the mesonotum, and on the scutellum. There are 2 thick tufts of yellow hairs, just above and behind the wing base. Pleura gray pollinose with abundant yellow hairs, with thicker tufts, 1 below the costa, the other below the caliptera. Coxae gray pollinose. Procoxae with long yellow hairs on the basal half and a mixture of long yellow and black hairs apically, other coxae with yellow hairs. Pro- and mesofemora blackish brown on basal half and two-thirds respectively, the remainder yellow brown. Hairs of pro- and mesofemora a mixture of yellow and black hairs predominating on but not restricted to the yellow and dark areas. Metafemora mostly blackish brown, yellow at tip, mostly black haired with a few yellow hairs dorsally. Pro- and mesotibiae yellow brown with very short yellow hairs. Pro- and mesotarsi as tibiae basally changing to dark yellow brown apically. Metatibiae and metatarsi dark yellow brown. Halteres yellow. Wings smoky brown. First posterior cell petiolate, fourth

posterior cell slightly coarctate. Fork of third vein with a long appendix. Dorsum of abdomen with segment 1 translucent, pale yellow and yellow haired. Tergite 2 translucent pale yellow except for a small median black spot on anterior margin approximately a third the width of the segment with a thin extension reaching two-thirds the distance to posterior margin. Vestiture of tergite 2 of short sparse black hair anteriorly, more numerous laterally, the posterior third with short yellow hairs. Tergite 3 with lateral black spots which reach two-thirds distance to posterior margin and extend a third the distance to midline. Area between spots anteriorly dark reddish brown, posteriorly to apical margin dark yellow. Vestiture black anteriorly, yellow posteriorly, the hairs more numerous laterally. Tergites 4-6 dark reddish brown. Vestiture mostly of black hairs with yellow hairs along posterior and posterolateral margins of segment 4. Ventrally segments 1-3 mostly pale yellow. Sternite 2 with a pair of small sublateral black spots. Sternite 3 with similar but larger spots. Vestiture mostly of short yellow hairs with black hair on and around spots. Sternite 4 as 2 and 3 but the spots expanded to bands fading at the midline and not reaching posterior margin. Other sternites dark reddish brown.

Male. Not known.

Distribution. Colombia (Valle).

Material examined. Colombia: Holotype, ♀, Valle, Penas Blancas, 1750m, 10km W Cali, caught flying near flank of cow at 1500hrs, 30 Dec. 1974, R. Wilkerson coll. Paratypes, Colombia, Valle, Penas Blancas, 1950m, 5♀, all from a bait horse, 23 Dec. 1974, 12, 15, 21, and 31 Jan. 1975, R. Wilkerson coll.

Discussion. Paratypes range in length from 17-18mm (\bar{x} =17.8mm). Frontal indices 2.6-4.7 (\bar{x} =4.0). Paratypes are in good agreement with holotype. Some specimens have darker frons, antennae, and palpi than holotype. The abdominal coloration is not constant. In one paratype the third tergite is completely dark and the third sternite has 2 large lateral spots; in another the third tergite is brown with 2 small lateral spots, third sternite is as in the holotype but the fourth is much paler.

E. tigrina is similar to *E. diaphana*, *E. balteata*, and *E. translucens*. I have not seen a specimen of *E. diaphana* but I was able to compare it using the original description (Schiner, 1868) plus the illustration of the holotype (Fairchild, 1967a). *Diaphana* has a shiny dark brown callus, palpi evenly covered with hairs, yellowish brown mesonotum with thick yellow hairs, gray pleura with whitish hairs, legs reddish yellow, first 2 abdominal segments somewhat translucent, reddish yellow, and the abdomen with numerous reddish hairs.

E. balteata has slender yellowish red antennae, palpi, and proboscis, rufous mesonotum and pleura, yellowish brown legs, and first two abdominal segments translucent pale yellow without a distinct middorsal black mark.

E. translucens has a gray beard, mesonotum and scutellum reddish pollinose with coppery red hairs, pleura gray pollinose and gray haired, and legs reddish black.

Esenbeckia (*Esenbeckia*) *tinatipennis* Kroker
(Fig. 14)

Esenbeckia (*Esenbeckia*) *tinatipennis* Kroker 1931, Zool. Anz., 94:256, figs. 6, 7, ♀, Colombia, Choco, Condoto. Lee, Fairchild,

and Baretto 1969, *Caldasia*, 10(49):443. Fairchild 1967, *Studia Ent.*, 9(1-4):345-346, fig. 9.

A large brownish black species with a narrow frons lacking a shiny callus, spatulate palpi, unicolorous dark brown legs, distinctly bicolored yellow and black wings, and white banded abdomen.

Female. Length 21mm. Frontal index 4.4. Frons yellowish brown pollinose. Callus grayish pollinose with its basal third flattened and widened but not touching sides of frons and the remainder a narrow ridge which reaches the ocellar tubercle. Subcallus dark yellowish brown pollinose. Genae and frontoclypeus sparsely dark grayish brown pollinose. A raised tubercle and three distinct ocelli present at vertex. Eyes bare, no color noted. Oculogenal hairs silvery white and numerous. Antennal segments 1 and 2 grayish black and black haired except for a few silvery white hairs below on segment 1. Segment 3 dark brown. Palpi broad, spatulate, blackish brown, the outer aspects bare mesially and margined with short dark hairs. Proboscis nearly as long as head height, dark brown, stout and shiny sclerotized. Beard white.

Mesonotum brown, sparsely brown pollinose with 2 pairs of incomplete whitish pollinose stripes anteriorly. Pleura and coxae brown, grayish brown pollinose mostly with sparse black hairs but having prominent tufts of silvery white hairs just behind the head and below the wing bases. Coxae and adjoining sclerites sparsely silvery white haired. Legs dark brown. Wings as figured, yellow basally, smoky brown apically.

Abdomen blackish brown, subshiny with sparse brown pollinosity. Above nearly entire first and posterior border of second segment pale

horn colored, the posterior borders of the remaining segments obscurely pale gray pollinose. Vestiture is of numerous short black hairs with sparse silvery white hair fringes on the posterior borders of tergites 1-3 and laterally on 4-6. Abdomen below with three irregular yellowish bands, the first includes all of the first sternite and anterior portion of second, the second is made up of the posterior portion of the second sternite and anterior part of the third, the third band is the posterior border of the third sternite. Vestiture below is of numerous very small dark brown hairs with a few pale hairs on the light areas.

Male. Not known.

Distribution. Colombia (Choco, Valle).

Material examined. Colombia: Valle; Rio Raposo, in mist net, 1♀ 27 Jan. 1965, V. Lee coll. This appears to be the only specimen collected since the type was described.

Esenbeckia (Esenbeckia) translucens (Macquart)

Pangonia translucens Macquart 1846, Mem. Soc. Sci. Lille (1845), p. 154, Pl. III, fig. 5.

Esenbeckia translucens: Fairchild 1942, Ann. Ent. Soc. Amer., 35(2):191-192, Pl. II, fig. 15, ♀, full references. Fairchild 1971, Cat Dipt. S. Amer., Fas. 28, p. 9, synonymy.

A large robust fly with a rufous mesonotum, smoky wings, unicolorous dark legs, and a blackish brown abdomen with the first two segments pale yellowish, semitranslucent, with a narrow median black mark.

Female. Length 13-19mm (N=13, \bar{x} =15.1mm). Frontal index 3.3-3.7 (\bar{x} =3.4). Frons divergent below, 0.6-0.8 (\bar{x} =0.7) times as wide above as below. Frons and subcallus grayish brown to pale yellow pollinose. Callus dark brown, long, nearly reaching ocelli, expanded gradually below, not touching sides of frons. Eyes greenish black in life. Genae and frontoclypeus silvery gray to pale grayish brown pollinose. Beard silvery gray. Antennal segments 1 and 2 grayish black pollinose and black haired, segment 3 reddish brown. Palpi dark brown, flat and without hairs on the outer aspect except for a border of short dark brown hairs. Proboscis about three-fourths as long as head height, the theca brown pollinose, the labella compact, partially shiny, partially subshiny with sparse grayish pollinosity.

Mesonotum and scutellum orange brown to brownish yellow with concolorous pollinosity and hairs. Pleura and coxae gray pollinose, with silver gray hairs, sharply contrasting with mesonotum. Legs dark brown with dark brown hairs. Wings smoky brown, first posterior cell petiolate, fourth posterior cell slightly coarctate. Fork of third vein with a long appendix.

Abdomen above with first two segments variable, in most specimens both are translucent pale yellow while the second segment is darkened laterally and bears a broad or narrow median dark streak. One example from Panama has the second segment entirely dark. Remaining tergites blackish brown with numerous very short dark hairs, except for white hair patches laterally on tergites 2-6. Apical margin of tergite 3 sometimes fringed with white hairs. Abdomen below as above but sternite 3 is also translucent in some specimens with lateral and median black marks, while in others this sternite is entirely black. Sternites 2-5 with apical fringes of white hairs.

Distribution. Mexico to eastern Peru and northern Brazil.

Colombia (Choco, Valle, Antioquia, Boyaca).

Material examined. Panama, 5^{♂♂}. Colombia: Valle; Rio Zabaletas, netted, 1[♀] 2 July 1975; Lower Anchicaya, 1[♀] 9 Aug. 1973, Wilkerson and Young coll; Municipio de Candelaria, Finca San Luis, from bait horse, 1[♀] 30 Jan. 1975; Choco; Rio Nimiquia, 2^{♂♂} 15 Aug. 1942; Antioquia; La Tirana, Providencia, 25km W, 22km S Zaragoza, in house at night, 1[♀] 29 May 1971; Putumayo; Mocoa, CO₂ baited flight trap, 650m, 2^{♂♂} 15 April 1976; Puerto Asis, CO₂ baited flight trap, 240m, 1[♀] 15 April 1976.

Discussion. The above description pertains especially to those specimens collected in Panama and northwest Colombia. Three specimens from Putumayo will not key out here. While quite similar they differ in the following respects: Size smaller, length 13-14mm; antennae and palpi paler; frontoclypeus and genae yellowish; pro- and mesothoracic legs yellow.

Fairchild (unpublished, 1978) reports *E. translucens* from Panama in areas of high rainfall and heavy forest. He states it will readily attack man and the undersides of horses. Lee et al. (1969) captured it in Valle, Rio Raposo, from a calf, 1[♀] 20 Aug. 1963. Bequaert and Renjifo (1946) found it in Boyaca, Muzo, and Porter (pers. comm. 1976) caught 66 specimens in the Providencia region of Antioquia.

Subgenus *Proboscoides* Philip

Proboscoides Philip 1943, J. New York Ent. Soc., 51(2):111.

Esenbeckia (*Proboscoides*): Fairchild 1969, Arq. Zool. S. Paulo, 17(4):201.

The labella of the proboscis is slightly lengthened, is wholly sclerotized, lacks pseudotracheae, and is forceps-like. The callus is pollinose in fresh specimens and the oculogenal hairs are sparse. One species has been taken in the study area. The taxon is treated as a subgenus due to species with intermediate proboscis characters, of which *ecuadorensis* is an example. The others of the group all occur east of the Andes, from Argentina to Trinidad.

Esenbeckia (Proboscoides) ecuadorensis ssp. *chagresensis* Fairchild

Esenbeckia chagresensis Fairchild 1942, Ann. Ent. Soc. Amer., 35(2):192-194, pl. 1, fig. 9, ♀, Panama.

Esenbeckia ecuadorensis ssp. *chagresensis* Fairchild 1971, Cat. Dipt. S. Amer., Fasc. 28:10.

A large species with a brown thorax, orange yellow antennae, brown spatulate palpi, short shiny black proboscis and smoky brown wings. Abdomen blackish brown with pale segmental borders.

Female. Lengths 17 and 18mm. Frontal indices 4.3 and 4.4. The following is the original description of Fairchild.

Eyes bare, dull greenish black in life. Frons yellowish grey pollinose, about five times higher than wide, widened at base and vertex, the basal suture obsolete. The frontal callosity in well preserved examples is represented by a slightly raised stripe from base to vertex covered with darker and more yellowish pollinosity. This stripe is broader at base, where it flattens out and runs down over the subcallus to the base of the antennae, and in rubbed specimens the upper and middle portions may become denuded, showing a more or less uneven shiny strip. The ocelli are prominent and yellow. Antennae orange yellow. The first segment somewhat inflated, the second small and produced in a short blunt tooth dorsally, both with numerous black hairs, which form a sort of style. The fourth division is markedly the smallest, while the terminal piece is spike-like, as long or longer than the previous four

divisions together. Clypeus and genae dark grey pollinose, with some dark hairs and light hairs forming tufts near the insertion of the palpi and along the genal margin of the eye. Genae with a deep groove running from the insertion of the palpi to a point even with the insertion of the antennae. Palpi black, curved, broad, blunt pointed, longer than antennae and clothed with black hairs on the inner surface, edges, and basal one-fifth of the outer surface. The inner surfaces of the palpi are round in cross section, the outer bare surfaced flat. Proboscis black, shiny, about equal to head height, the labella and theca of the labium both entirely sclerotized, the former a little less than one-half length of latter.

Mesonotum chocolate brown, covered with white pollen giving it a purplish cast, and with sparse black hairs. Pleura and sternum dark grey with white hairs. Scutellum concolorous with mesonotum. Prescutellar lobe prominent. Subepaulet subtriangular, thin, scale-like, without macrotrichia. Costa and first vein above and beyond arculus with macrotrichia, other veins bare. First posterior and anal cells closed and petiolate, a moderate appendix on the upper branch of the third vein. Whole wing deeply fumose. All legs entirely black with black hairs. Coxae white haired.

Abdomen: First tergite straw yellow, translucent, with white hairs on the lateral and posterior margins, black hairs in a small patch on each side of the scutellum. Second tergite varying from clear yellow with a small brown spot on each lateral margin to entirely black. Succeeding segments black. All tergites with narrow light hind margins which bear white hairs, while the yellow or black anterior four-fifths of the segments bear black hairs. Venter: First two or three sternites largely yellow with lateral black patches, or entirely black with light hind margins. Fourth to terminal sternites black with light hind margins.

(1942a, pp. 192-194)

Male. Not known.

Distribution. Panama, Colombia (Magdalena).

Material examined. Panama, 2^{♂♂} (including 1 paratype).

Discussion. *E. ecuadorensis ecuadorensis* Lutz and Castro differs by having reddish instead of dark hairs on the thorax and by having a paler abdomen with the first 3 tergites nearly wholly yellowish. The

nominate form is reported from western Ecuador and *chagresensis* from eastern Panama and northern Colombia (Bequaert and Renjifo [1946] report it from Magdalena, Rio Frio).

Genus *Fidena* Walker

Fidena Walker 1850, Ins. Saund., Dipt. 1:8. Mackerras 1955, Aust. J. Zool., 3(3):487-490, full references. Fairchild 1971, Cat. S. Amer. Dipt. Fasc. 28, p. 16, synonymy.

Members of this genus have a long produced face, a long slender proboscis, pilose eyes and subulate antennae. The first posterior cell is almost always closed or coarctate and the fourth always open.

All species are forest inhabiting.

Key to *Fidena* species

1. Legs prominently bicolored, the femora black, the tibiae and tarsi yellow. Wings black or heavily infuscated basally to ends of basal cells 2
- 1'. Legs not bicolored, all black or yellowish. Wings rarely heavily infuscated basally, usually evenly tinted 3
- 2(1). Beard snow-white. Sides of mesonotum with a stripe of white hairs from before suture to posterior margin. Abdomen shiny black, with small tufts of silver-white hairs in middle of tergites 2-5, and at sides of tergites 2, 5 and 6. Sternites 2-4 with white lateral hair tufts; 2 sometimes with white hind marginal band. Face partially denuded and shiny.
. *eriomerooides*
- 2'. Beard black or dark brown. Mesonotum without contrasting pale hairs. Abdomen shiny black or deep brown with segments 4 or 5 to 7 clothed with pale straw yellow, rufous orange, brown or black hairs. Tergite 2 with a patch of white hairs at sides,

- and sternites 2-4 with small lateral white hair tufts. Rarely
tergites 3 and 4 may have small median white hair tufts
. *rhinophora*
- 3(1'). Legs pale yellowish brown. Beard, pleura and venter of abdomen
pale yellowish-haired or orange yellow, contrasting with dark
dorsal surfaces *auribarba*
- 3'. Legs dark brown to black. 4
- 4(3'). Beard and sides of thorax brown to black haired. Abdomen
largely black haired, although the terminal segments may be
golden haired 5
- 4'. Beard and usually sides of thorax white or golden haired. . . . 7
- 5(4). Large species, wing length generally over 18mm. Frons narrow,
over 4.5 times as high as wide, convergent below. Antennae
brownish black. Face brown, wholly grayish pollinose. Wings
uniformly deep yellowish brown tinted 6
- 5'. Small species, wing length generally less than 12mm. Frons
about 3 times as high as wide, parallel sided. Antennae bright
yellow. Face yellow, with extensive bare patches laterally.
Wings smoky hyaline, the costal cell blackish and end of first
basal cell darkened. Abdomen black, the second segment sparsely
white haired above and below, forming a more or less distinct
hind marginal band widened at sides above. Tergites 5-7
sparsely white haired and often with median white triangles
on tergites 3 and 4 *schildi*
- 6(5'). Tergites 2, 5 and 6 with, or rarely without postlateral pale
hair tufts, usually silvery white, rarely yellowish, but
centers of all tergites black haired. *flavipennis*

- 6'. Tergite 2 without posterolateral silvery hair tufts, but tergites 3 or 4 to 6 clothed with pale straw-colored to orange hairs. *flavipennis vallengis* n. ssp.
- 7(4'). Beard and sides of thorax white haired. Face gray pollinose, palpi very slender. *aureopygia*
- 7'. Beard and usually parts of sides of thorax yellow haired. . . . 8
- 8(7'). Beard, notopleural lobes, pleura, and mesonotum golden yellow haired. Face subshiny dark brown or reddish brown, evenly brown pollinose (Fig. 3A-D) *sulfurea* n. sp.
- 8'. Beard and pleura pale yellow haired, notopleural lobes and mesonotum black haired. Face gray pollinose above with broad shiny blackish brown shiny sides. *ochrapogon* n. sp.

Fidena aureopygia Kroeber

Fidena aureopygia Kroeber 1931, Zool. Anz., 95:24, fig. 9, ♀, Colombia, Choco. Fairchild 1967, Studia Ent., Sao Paulo, 9(1-4):346, fig. 21.

The type locality of *Fidena aureopygia* is Colombia, Choco, Opagodo; it has also been reported from Valle, Aji, Rio Naya, S. Renjifo coll (Bequaert and Renjifo, 1946). I have not seen a specimen of this species but will include a partial description of the holotype and paratypes, both females, reported by Fairchild.

Length of holotype 20mm. "Frons parallel sided, rather narrow, face protuberant, gray pollinose. Palpi very slender, much exceeding apex of clypeus. Beard and sides of thorax white haired. Legs unicolorous brownish black. Abdomen very dark mahogany brown, black haired on first three tergites, golden yellow haired on remainder.

Wings uniformly pale brownish without dark bases or clouds at end of basal cells. . . . The species is nearly identical structurally with *F. bicolor* Krober and *F. flavipennis* Krober, but differs markedly in color from either" (1967, p. 346).

Distribution. Colombia (Valle, Choco).

Fidena auribarba (Enderlein)

Melpia auribarba Enderlein 1925, Mitt. Zool. Mus. Berlin, [♀], Colombia.

Melpia auribarba var. *albibarba* Enderlein 1925, Mitt. Zool. Mus. Berlin, 11(2):276, [♀], Colombia.

Fidena auribarba and var. *albibarba*: Fairchild 1958, Ann. Ent. Soc. Amer., 51(6):528-529, full references; 1971, Cat. S. Amer. Dipt. Fasc. 28, p. 18.

Melpia columbiensis Krober 1934, Rev. Ent., 4(2):247. Fairchild 1951, Ann. Ent. Soc. Amer., 44(3):442, Panama, full references.

Fidena columbiensis Krober 1934, Rev. Ent., 4(2):247. Fairchild 1951, Ann. Ent. Soc. Amer., 44(3):442, Panama, full references.

A medium to large dark brown species with an orange yellow beard and pleura. Wings smoky brown, legs unicolorous yellowish orange and abdomen above dark brown with small median light yellow or orange hair patches on each segment, below light yellow pollinose with yellowish or orange hairs.

Length of orange yellow form 14-17mm (N=20, \bar{x} =15.6mm, ¹1SD=0.64mm), of light yellow form 13-17mm (N=20, \bar{x} =17.5mm, 1SD=1.5mm). Frontal index of both forms about the same, 1.9-2.9 (N=40, \bar{x} =2.5). Frons and subcallus dark brown, brown pollinose, with a few thin black hairs on frons. Slightly raised tubercle and 3 ocelli present. Eyes pilose,

¹1SD = One standard deviation. Stated only when comparisons are appropriate or there is overlap in the range of measurements.

covered with many very short hairs, color not noted. Frontoclypeus brown, brown pollinose above, apical fourth shiny black, sides shiny black at apex, subshiny brown pollinose to head. Antennae dark brown, brownish pollinose. Palpi slender, brownish pollinose. Proboscis shiny black, one-half to two-thirds as long as body. Beard orange yellow or light yellow.

Mesonotum dark brown pollinose with short black hairs above and many long black hairs laterally and behind. Scutellum dark brown anteriorly, orange brown posteriorly. Pleura light grayish yellow pollinose and except for a few black hairs on and between coxae is either thickly pale yellow or orange yellow haired. Legs yellowish brown, mostly pale haired. Wings smoky brown, first posterior cell coarctate or closed, without appendix at fork of third vein.

Abdomen dark brown and dark haired above with small median light yellow or yellowish orange hair tufts on 2-6 and sometimes 1-7. Laterally long yellowish or orange hairs on each segment. Below light yellow pollinose with yellowish or orange hairs. As described above there are 2 distinct color forms, one light yellow haired, the other orange yellow.

Distribution. Panama (light form only), Colombia (both forms, Choco, Valle).

Material examined. Light form. Panama, 8⁰⁰₊⁰⁰₊. Colombia: Choco, Rios San Juan-Baudo, netted, 4⁰⁰₊⁰⁰₊ 23 Feb. 1976; Valle; 41km E, 20km N, Buenaventura, flight trap baited with CO₂, 148⁰⁰₊⁰⁰₊ 19 March 1976, Rio Zabaletas, netted and flight trap baited with CO₂, 8⁰⁰₊⁰⁰₊ 18 Aug. 1975, Lago Calima, from livestock, 1⁰₊ 10 Oct. 1975, 1⁰₊ 9 April 1976, Lower

Anchicaya, netted 2⁰⁰ 10 Aug. 1973, 1⁰ 2 April 1976, Rio Raposo, 1⁰ 13 March 1963. Orange yellow form. Colombia; Choco, Rios San Juan-Baudo, netted, 3⁰⁰ 23 March 1976; Valle; 41km E, 20km N Buenaventura, flight trap with CO₂, 38⁰⁰ 19 March 1976, Rio Zabaletas, netted and flight trap with CO₂, 2⁰⁰ 18 Aug. 1975, Lower Anchicaya, netted, 1⁰ 2 April 1976.

Discussion. Some question remains whether this is a dimorphic species or a pair of closely related species. I can find no morphological differences externally or in the genitalia. Until proven otherwise I will treat them as a single species. The original description of *Melpis auribarba* by Enderlein (1925) is the orange form. In the same publication he designated the light yellow form as variety *albibarba*, but this name cannot be used since Enderlein also used it to name another species of *Fidena*; even though having page preference, the variety has no nomenclatural status. *Fidena columbiensis* Krober, however, was described from the light yellow form. The yellowish form predominates in collections from both Panama and Colombia.

Fairchild (pers. comm. 1978) found only the yellow form in Panama, and saw orange specimens only from Colombia. I have seen only the yellow form from Panama but the two occur together in the departments of Choco and Valle, the yellow form about 3 or 4 times more abundant.

Lee et al. (1969) collected several specimens of the light form on the Rio Raposo as they came to human bait at ground level, all in March, 1963 and 1965. Fairchild (unpublished 1978) reports the species attacks man readily and has been taken in the treetops and at ground level.

Fidena eriomeriodes Lutz

Epipsila eriomeroides Lutz 1909, Zool. Jahrb. Suppl. 10, H. 4, p. 649, fig. 27, S. Paulo, Brasil. Fairchild 1961, Mem. Inst. Osw. Cruz. 59(2):217, pl. 1, fig. 6.

Fidena eriomeroides: Fairchild 1971, Cat. S. Amer. Dipt., Fasc. 28, p. 19, synonymy.

A medium to large blackish brown fly with a white beard, thorax blackish brown haired except for lateral white mesonotal stripes. Legs bicolored blackish brown and brownish yellow, wings hyaline with basal third darkened.

Female. Length (Colombian material) 11-16mm (N=9, \bar{x} =14.3mm). Frontal index 2.5-3.2 (\bar{x} =2.9). Frons and subcallus blackish brown, dark yellowish brown pollinose. Vestiture of short black hairs, longer and thicker at vertex. Tubercle and 3 distinct ocelli present, callus not shiny. Eyes densely short pilose, bright green in life. Fronto-clypeus produced, nearly as long as antennae, with blackish brown shiny stripes above and on sides, the remainder gray pollinose. Proboscis slender, nearly two-thirds as long as body. Antennae dark brown, the third segment gradually narrowed, last annulus short, rather blunt. Palpi slender, acutely pointed, outer aspect without hairs, yellowish brown pollinose. Beard white.

Mesonotum blackish brown with brown pollinosity, dark haired except for lateral white hair stripes beginning just behind head and extending to above and behind wing base. Pleura and coxae blackish brown, brown pollinose with thick dark brown hairs. Femora dark reddish brown, dark haired. Tibiae and tarsi brownish yellow with

short yellowish hairs. Wings nearly hyaline with brownish tint, darkest on costal margin. Basal third of wing to apices of basal cells blackish, most deeply colored at the wing base. First posterior cell coarctate or closed, fork of third vein without appendix.

Abdomen blackish brown with short dark hairs, dorsally with very small median apical, white hair patches, laterally with small white patches on segments 2, 5, and 6. Below segment 2 with a few median white hairs.

Male. A male from Antioquia differs from females in nearly lacking white hairs at sides of thorax and having a dark brown beard. The upper eye facets are enlarged, but not sharply demarcated from the lower facets.

Distribution. Costa Rica to Brazil. Colombia (Valle, Antioquia, Meta, Narino).

Material examined. Costa Rica, 1♀. Panama, 4♀♀. Ecuador, 3♀♀. Peru, 1♀. Brazil, 1♀. Colombia: Valle; Lower Anchicaya, CO₂ baited flight trap, 3♀♀ 16 Aug. 1975, 2♀♀ 2 April 1976; Antioquia; La Tirana, Providencia, in house at night, 25km W, 22km S of Zaragoza, 1♂ 29 May 1971; Meta; Villavicencio, 3♀♀ 23 Sept. 1942, 1♀ 1924.

Discussion. The above description is of Colombian specimens. All examined are in close agreement except for overall paler color in older examples.

Bequaert and Renjifo (1946) reported specimens from Meta, Restrepo and Villavicencio, and Narino, Pasto.

Fidena flavipennis Krober

Fidena flavipennis Krober 1931, Zool. Anz., 95(1-2):24, fig. 8, ♂, Venezuela. Fairchild 1971, Cat. S. Amer. Dipt., Fasc. 28, p. 20, synonymy.

Fidena isthmiae Fairchild 1941, Ann. Ent. Soc. Amer., 34(3): 642-643, fig. 1, ♀, Panama.

A large dark brown species, dark brown haired with yellowish brown wings, unicolorous dark brown legs and small white hair patches just below wing bases. Abdomen shiny black to shiny dark reddish brown with small yellow or white patches laterally on segments 2, 5-7 and ventrally on 2.

Female. Length 16-18mm (N=11, \bar{x} =16.7mm). Frontal index 4.2-6.0 (\bar{x} =5.1). Frons slightly widened above, dark brown pollinose with very short dark hairs. Slightly raised tubercle with 3 ocelli present. Eyes covered with many very short hairs black in life. Subcallus subshiny blackish brown with dark brown pollinosity. Frontoclypeus dark brown pollinose except for tip which is shiny black and black haired. First 2 antennal segments dark, third dark yellowish brown. Palpi bare, dark brown pollinose on outer aspects, borders and tip shiny, dark, with dark hairs. Proboscis slender, shiny dark brown with a yellowish brown tip, a half to two-thirds as long as body. Beard dark brown.

Mesonotum and scutellum dark brown, hairs dark brown and short above, long and dense laterally especially so between wing base and scutellum. Pleura and coxae dark brown with dark brown hairs except for small white hair patches at the wing bases and on the distal calypters. Legs unicolorous blackish brown, dark haired except for many short yellow brown hairs ventrally on the protibiae and tarsi. Wings yellowish brown, darker at base and along costal margin, apex

with a slight blackish hue. First posterior cell petiolate, no appendix at fork of third vein.

Abdomen shiny brown to deep blackish brown with some short dark hairs above and below. Tergites 2, 5, and 6 usually with postlateral white or pale yellow hair tufts, the centers of all tergites black haired.

Male. Males are very similar save for sexual differences. The upper eye facets are slightly enlarged, but not clearly demarcated from the lower facets.

Distribution. Mexico to Colombia (Choco, Antioquia).

Material Examined. Mexico, 2^{♀♀}. Panama, 8^{♀♀} 1♂. Colombia: Choco; La Teresita, 1[♀] 6 Aug. 1967, 1[♀] 12 Nov. 1967, 1♂ 6 Oct. 1967, D. G. Young coll.

Discussion. Fairchild (unpublished 1978) reports this species from the lowlands of Panama up to 2500 ft. not restricted to forested areas. There is no evidence it is attracted to man but one was caught biting a boa and 4 biting a dead cayman (C.O. Myers, Darien, Panama). Porter (pers. comm. 1976) captured this species in Antioquia and Lee et. al. (1969) caught a single specimen in a mist net near the Rio Dagua in the Municipio of Buenaventura, Colombia, on 25 Aug. 1964, but these last have not been seen, and I do not know if they are typical *flavipennis* or ssp. *vallensis*.

Fidena flavipennis vallensis n. ssp.

A large dark brown fly, dark brown haired with yellowish brown wings, unicolorous dark brown legs and small white hair patches just

below wing bases. Abdomen shiny dark reddish brown with shiny golden yellow hairs on last few abdominal segments.

Female. Length 17-18mm (N=4, \bar{x} =17.25mm). Frontal index 5.2-5.9 (\bar{x} =5.5). *Vallensis* is not separable from the nominate form except by abdominal vestiture. There are shiny golden yellow hairs as follows: in most specimens large lateral patches on tergite 3, lateral patches which extend all along posterior border of tergite 4, and tergites 5-7 entirely covered. Below the yellow hairs are much sparser than above, confined mostly to the lateral areas of sternites 3-7.

Male. As male of nominate form.

Distribution. Colombia (Valle).

Material examined. Colombia: Valle; Lower Anchicaya, netted, 1♂ 29 Jan. 1975, 1♀ 5 March 1976, 1♂ in CO₂ baited flight trap, 2 April 1976; Rio Zabaletas, netted, 2♀♀ 18 Aug. 1975; Bajo Calima, netted, 1♀ 5 Sept. 1975.

Discussion. The nominate form differs by having small lateral white hair patches on tergite 2 and lateral white or pale yellow patches on segments 5-7 which do not extend over entire width of segment.

Porter (pers. comm. 1976) captured this species in Antioquia and Lee et al. (1969) caught a single specimen in a mist net near the Rio Dagua in the Municipio of Buenaventura, Colombia, on 25 Aug. 1964. These specimens have not been seen and I do not know if they are typical *flavipennis* or the subspecific form named here.

Fidena ochrapogon n. sp.

A large deep reddish brown fly with beard, thorax to between first pair of coxae and along upper pleura to wing base, densely yellow haired. Legs unicolorous dark reddish brown, wings smoky brown, abdomen without markings save for small white hair patches laterally on terminal segments and laterally on second sternite.

Female. Length 16mm; of wing 15mm. Frons slightly divergent below, 1.2 times wider than vertex. Frontal index 2.7. Frons with lower third black, slightly raised, middle third deep reddish brown with a median dark area and upper third including tubercle black. Frons covered with pale yellow pollinosity. Vestiture of a moderate number of thin black hairs below tubercle and longer thicker black hairs above tubercle. Callus not shiny, present as pollinose raised area below. Eyes covered with many short hairs, color not noted. Subcallus dark brown, subshiny with dark yellowish brown pollinosity, more dense along lateral edges and around antennal bases. Genae dark brown with light gray pollinosity. Frontoclypeus dark reddish brown with sparse grayish pollinosity except for rather wide lateral shiny bare areas. First 2 antennal segments and base of first annulus reddish brown, sparsely yellow brown pollinose, remainder of third segment blackish brown with yellowish brown pollinosity. Vestiture of black hairs. Palpi long and slender, dark brown, outer aspect without hairs, brownish pollinose. Proboscis blackish brown, 10mm long. Beard of long dense yellow hairs.

Mesothorax and scutellum reddish brown with sparse grayish pollinosity, vestiture short dark brown hairs above, long dense dark brown hairs laterally and at border with scutellum. Pleura brown, grayish brown pollinose. Vestiture of dense yellow hairs behind head

to first pair of coxae and covering mesoanepisternum. Remainder of pleura with long dark brown hairs. Procoxae blackish brown with long yellow hairs basally and long dark brown hairs apically. Remaining leg segments dark reddish brown except pro- and mesotibiae and tarsi which are slightly lighter. All hairs blackish except for a fringe of yellow brown hairs on protibia and tarsi. Halteres with stem brown and knob blackish brown. Wings smoky brown, slightly darker anteriorly and along veins. First posterior cell petiolate, short appendix at fork of third vein.

Abdomen shiny, dark reddish brown, darker on apical margins. Vestiture of short sparse dark brown hairs, longer and denser laterally and on terminal segments. Small white hair patches are found laterally on segments 4-7 and larger lateral patches on sternite 2.

Male. Not known.

Distribution. Colombia (Cauca, Caqueta, Putumayo), Ecuador (Cuenca), and Peru (Campana, near Trujillo).

Material examined. Colombia: Holotype, ♀, Putumayo, Puerto Pepino, 500m, 10 Nov. 1968, collector unknown. Paratypes, Colombia: 1♀ same data as holotype; Cauca; Cerro de Munchique, 2450m, 1♀ 6 Aug. 1973, Wilkerson and Young coll; Caqueta; Florencia, 1♀ 1936. Ecuador: Cuenca, 1♀ 22 Feb. 1950, S. W. Frost coll. Peru: Cerro Campana near Trujillo, 600m, 1♀ 10 Oct. 1939, leg. W. Weyrauch; Campana, 1500m, 2♀♀ 10 Oct. 1939, leg. W. Weyrauch.

Discussion. Paratypes range in length from 15-17mm (\bar{x} =16.0mm) and have frontal indices of from 1.6-2.7 (\bar{x} =2.3). All paratypes agree well with the above description.

Approximately a third of the 75 named species are available for comparison. Of these, *ochrapogon* is closest to *F. howardi* Fairchild and *F. trapidoi* Fairchild. *Howardi* has a longer, more slender proboscis, a white beard, dark brown hairs on the upper pleura, and golden yellow hairs on abdominal tergites 3-7. *Trapidoi* has a more slender proboscis, much less produced face, wholly brown haired pleura, whitish hair tufts on either side of the scutellum, and a quite distinctive pattern of bright golden yellow hairs on the abdominal dorsum which leaves a broad middorsal and 2 lateral stripes on segments 2-4, the remaining segments wholly yellow haired.

Ochrapogon is similar also to a species named here, *sulfurea*. Refer to the key for comparison.

The name means "yellow beard."

Fidena rhinophora (Bellardi)

Pangonia rhinophora Bellardi 1858, Sagg. Ditt. Mess., pp. 46-47, Tab. 1, fig. 1, ♀, Mexico.

Fidena rhinophora: Fairchild 1953, Ann. Ent. Soc. Amer., 46(2):262.

Pangonia pyrausta Osten Sacken 1886. Biol. Centr. Amer., Dipt. 1, pp. 43-44, ♀, Panama.

Fidena pyrausta: Fairchild 1941, Ann. Ent. Soc. Amer., 34(3): 644-645, full references; 1951, Ann. Ent. Soc. Amer., 44(3):441; 1956, Smiths. Misc. Coll. 131(3):26, type seen.

Melpia auricauda Enderlein 1925, Mitt. Mus. Berlin, 11:276, ♀, Colombia, Venezuela. Kroker, 1930, Mitt. Zool. Mus. Hamburg, 44:179, fig. 28.

A medium sized dark brown or black species with dark beard and pleura, bicolored black and pale yellow legs, basally darkened wings, and abdomen black with yellow or orange yellow hairs on the last few segments.

Female. Length 12-16mm (N=39, \bar{x} =14.0mm). Frontal index 1.9-2.8 (N=39, \bar{x} =2.3). Frons very slightly convergent above, dark brown with grayish brown pollinosity and some short dark hairs. Raised tubercle and 3 prominent ocelli present. Eyes short pilose, blackish in life. Subcallus dark brown, subshiny with yellowish brown pollinosity. Frontoclypeus produced, nearly as long as antennae, shiny black area nearly reaching subcallus. Laterally, upper half gray pollinose, below subshiny brown pollinose. Proboscis shiny blackish brown, slender usually two-thirds or three-fourths as long as body. Antennae dark brown. Second palpal segment dark brown with brownish pollinosity, acutely pointed, about as long as third antennal segment. Beard blackish brown.

Mesonotum dark brown, obscurely striped. Vestiture of numerous short dark hairs above, longer and denser laterally and behind. Pleura and coxae brown with blackish brown hairs. Femora blackish brown, dark haired. Tibiae and tarsi pale yellow, pale yellow haired except for last 1 or 2 tarsal segments which are brown and brown haired. Wings pale smoky, wing base and veins darker to ends of basal cells. First posterior cell variable from completely open to closed. Fork of third vein sometimes with a very short appendix.

Abdomen variable. Overall coloration shiny dark blackish brown, with sparse black hairs. Segment 2 may or may not have a small lateral white hair tuft above and below. Segments 5-7 nearly always pale yellow

in ground color. Segment 4 varies from dark blackish brown to yellowish brown. Vestiture on these last segments varies from pale yellow to orange yellow, on some beginning at the apical border of segment 3, on others restricted to segments 5-7.

Male. Not described.

Distribution. Mexico to eastern Peru and Venezuela. Colombia (Choco, Valle, Cauca, Meta, Boyaca, Magdalena).

Material examined. Mexico, 1♀. Panama, 12♀♀. Ecuador, 1♀. Peru, 1♀. Venezuela, 2♀♀. Colombia: Valle; Lago Calima, from live-stock, 10♀♀ Aug. 1975, 11♀♀ Sept. 1975, 7♀♀ Oct. 1975, 4♀♀ 7 Nov. 1975, 6♀♀ 26 March 1976, 16♀♀ April 1976; "Playa Rica," from livestock, 2♀♀ 3 Feb. 1976; Penas Blancas, from livestock, mostly horses, 2♀♀ 3-12 Aug. 1973, 1♀ 5 March 1975, 2♀♀ 24 March 1975, 1♀ 4 April 1975, 4♀♀ 29-30 April 1975, 7♀♀ May 1975, 2♀♀ 26-30 June 1975, 1♀ 16 July 1975, 1♀ 30 July 1975, 4♀♀ Aug. 1975, 1♀ 10 Dec. 1975, 1♀ 27 Feb. 1976, 1♀ 22 March 1976, 1♀ 12 April 1976; Cauca; Cerro de Munchique, netted, 2♀♀ 8 Aug. 1975. Meta, Villavicencio, Fr. Cepallinaire-Marie, 1♀ 1924.

Discussion. A great deal of variability exists over the entire range of this species. Some question remains as to the possibility of the existence of more than one species. Fairchild (unpublished 1978) discusses this variation and since the material I have from northwest Colombia appears to vary only in abdominal coloration, I will not discuss it further here.

Bequaert and Renjifo (1946) report it from Boyaca, Muzo which is the type locality of *Melpia auricauda*. Kroeber (1930a) reports 2♀♀ of *pyrausta* from the Magdalena River.

F. rhinophora readily bites man (Fairchild, unpublished 1978) and is evidently primarily an early morning flier. One was taken during a horse biting study at Penas Blancas at 0630hrs with the sun out, temp 18°C and 73% RH.

Fidena schildi (Hine)

Erephopsis schildi Hine 1925, Occ. Pap. Mus. Zool. Univ. Michigan, No. 162, pp. 11-12, ♀ Costa Rica.

Fidena schildi: Fairchild 1941, Ann. Ent. Soc. Amer., 34(3):644, full references; 1971, Cat. S. Amer. Dipt. Fasc. 28, p. 23, synonymy.

A small to medium sized dark brown species with orange yellow antennae and palpi and yellowish brown frontoclypeus. Legs unicolorous dark brown, wings pale brown. Abdomen with some white hairs laterally on segment 2 and on apical borders of most segments.

Female. Length 9-12mm (N=10, \bar{x} =10.3mm). Frontal index 2.7-3.1 (\bar{x} =3.0). Frons blackish brown, yellowish brown pollinose with thin sparse black hairs. Flightly raised tubercle and 3 distinct ocelli present. Eyes pilose with a moderate number of very short hairs, blue green in life. Subcallus subshiny, pale brown with pale yellow pollinosity. Frontoclypeus yellowish brown with grayish pollinosity except for shiny lateral bare areas. First 2 antennal segments yellowish brown, black haired, the third segment orange yellow. Palpi orange yellow, mostly bare. Proboscis usually slightly recurved about half as long as body, shiny, dark brown, some specimens yellowish brown basally.

Mesonotum and scutellum blackish brown with short dark brown hairs, longer and more numerous laterally. Pleura and coxae brown in ground

color, grayish brown pollinose with dark brown hairs. Legs dark brown, dark haired, all tarsi and protibiae slightly paler with some dark yellow hairs ventrally. Wings nearly hyaline with a brownish cast, slightly darker at costal margin. First posterior cell coarctate to petiolate, fork of third vein with a very short appendix or none at all.

Abdomen dark brown with dark brown hairs. Segment 2 with lateral white hair patches. Dorsally segment 3 with a small medium white patch on apical border, segment 4 a broader apical patch, and remaining segments with apical borders entirely white haired. Ventrally apical borders of 2-7 with short white hairs.

Male. Not known.

Distribution. Costa Rica to Colombia (Antioquia), French Guiana, Brazil.

Material examined. Panama, 15^{♂♂} (including one compared with type of *Melpia nigricans* a synonym of *F. schildi*). 1[♀] French Guiana.

Discussion. Although this species seems to have a wide distribution it has been recorded in Colombia only from the type of *M. nigricans* (without definite locality) and by C. Porter (pers. comm. 1976) from the Providencia region of Antioquia.

Fairchild (unpublished 1978) reports that in Panama it will attack man at ground level and has been caught biting pigs before dawn.

Fidena sulfurea n. sp.
(Fig. 3A-D)

A large reddish brown to blackish brown species with proboscis at least half as long as body, face well produced, beard, mesonotum, and much of pleura densely yellow haired, legs unicolorous dark, and abdomen with at least tergites 4-7 thickly yellow haired.

Female. Length 16mm; of wing 16mm. Head structures as figured. Frontal index 2.5. Frons divergent below, 1.2 times as wide as vertex. Frons blackish brown in ground color with yellowish brown pollinosity and sparse slender black hairs. Ocellar tubercle and 3 ocelli quite distinct. Eyes pilose, color not noted. Subcallus, genae, and frontoclypeus blackish brown with yellowish brown pollinosity. Frontoclypeus subshiny with less dense pollinosity laterally below the antennal bases. Face well produced, 1.1 times as long as frons is high. Beard is of dense yellow hairs. Antennal segments 1 and 2 blackish, with yellowish brown pollinosity and black hairs, segment 3 black. Palpi blackish brown, the hairs of segment 1 yellow. Proboscis shiny blackish brown, 9mm long.

Mesonotum and scutellum reddish brown in ground color with grayish yellow pollinosity and numerous long yellow hairs. Pleura and coxae blackish brown and brown pollinose. Vestiture of long dense yellow hairs all around wing base, just posterior to the head, and on the bases of the procoxae, the remainder is of long dense dark brown hairs. Legs are blackish brown and dark haired except for the short orange yellow hairs on the undersides of the tarsi. Halteres dark brown, the stem paler. Wings fumose, the costal and subcostal cells darker and the veins margined slightly darker. The first posterior cell petiolate, the fourth open.

Abdomen above dark reddish brown. Vestiture of sparse black hairs on tergites 1-3, denser laterally on 1-3 and mesially on 1 and 2. Tergite 2 with small lateral white hair patches. Lateral aspects of tergite 4 black haired. The remainder of the dorsum starting with the

apical margin of tergite 3 is densely yellow haired. Below abdomen is shiny dark reddish brown with some sparse grayish pollinosity on the last few segments. Vestiture is of sparse black hairs except for a distinct lateral white haired patch on sternite 2 and small lateral yellow haired patches on 5-7.

Male. Not known.

Distribution. Colombia (Valle, Cauca, Magdalena, Caqueta).

Material examined. Colombia: Holotype, ♀, Valle, 8km below dam at Lago Calima, 1250m, from livestock, 4 Sept. 1975, R. Wilkerson coll. Paratypes, 3♂♂ with some data as above, 1♀ same data except 8 Aug. 1975, 1♀ same data except 12 Aug. 1975; Cauca; La Cumbre, 3000', 1♀ 15 Dec. 1922, H. L. V. coll; Magdalena; Northwest Sierra Nevada de Santa Marta, 6-8,000', 4♂♂ 22 July 1928, Darlington coll; Vista Nieve, Mount San Lorenzo, 1♀ 8 Aug. 1926, Walker coll (with note 7 more same data, Copenhagen); Caqueta; Florencia, 1♀ 1936.

Discussion. Paratypes range in length from 16-17mm (N=13, \bar{x} =16.2mm) and have frontal indices of from 2.3-3.6 (\bar{x} =2.8). All paratypes agree well with the above description. Several specimens have dorsal yellow abdominal hairs over the entire segment 3, though not as dense as on the remaining segments. The example from La Cumbre has sparse yellow hairs also on tergite 2 and the specimen from Florencia has more extensive dense yellow hairs on the pleura and also has additional sparse yellow hairs on abdominal tergites 1-3.

Five additional specimens before me from Magdalena are morphologically similar to *F. sulfurea* but have entirely dark brown haired pleura and mesonota. These may be a form of *sulfurea* but I believe them to be a distinct species.

Of the relatively few species available for comparison *sulfurea* is most like *F. howardi* and *F. trapedoi*. *Howardi* has a white beard, brown haired pleura, and wholly brown haired mesonotum. *Trapedoi* also has wholly brown haired mesonota and pleura.

F. ochrapogon, described here, is also similar. Refer to the key for their discrimination.

Genus *Scione* Walker

Scione Walker 1850, Insecta Saund., 1:10.

The genus *Scione* may be distinguished primarily by the closed first and fourth posterior cells. It is similar to *Fidena* in that both have a long slender proboscis and produced face. *Scione*, however, often has a hairy frontoclypeus and patterned wings, characteristics not found in *Fidena*. In addition many *Fidena* species have bare or partially bare faces, while all of the *Scione* species are wholly pollinose. In *Scione* the frons is usually wide and divergent below.

The center of distribution of the genus is the mountains of northwestern South America.

There are 33 described species in the neotropics, 13 of which are reported in Colombia, in addition 6 new Colombian species are described here.

Of the 13 species reported from Colombia or with ranges which include Colombia, I have been able to recognize among my material only 5 from their descriptions: *albifasciata* Macquart, *maculipennis* Schiner, *obscurifemorata*, *rufescens* Ricardo, and *flavescens* Enderlein. Two of the remaining 8 species were only tentatively recorded from Colombia in Fairchild's catalogue (1971), *distincta* Schiner, type locality "Sud Amerika," and *rufipes* Kroeber, type locality "Venezuela." The types of *minuta* Szilady and *punctata* Szilady, both from "San Lorenzo, Colombia" were destroyed in Budapest, and the published descriptions are inadequate for recognition. The lectotype of *incompleta* Macquart is a male, and according to Fairchild (pers. comm., 1978) is a black species with wings with dark clouds around crossveins but no yellow, all femora and metatibiae black, but pro- and mesotibiae yellow.

The female associated with this male by Macquart is a pale yellow species with yellowish brown legs, some yellow in wing pattern, and is very unlikely to be the same species. Neither male nor female of *incompleta* seem to agree with any of my Colombian specimens. The type of *minor* Macquart, according to unpublished notes of Fairchild is in very poor condition. He had a compared specimen, but this cannot now be found. He felt that Macquart's specimen did not represent the same species as those subsequently discussed by Schiner (1868) and Krober (1930). The type locality was given as de l' Amerique?, the Colombia and Venezuela localities given in Fairchild's catalogue (1971) possibly originating with Schiner and Krober, and hence not referring to true *minor*. *Scione nigripes* Krober was described from New Granada, and the type in Halle was reexamined by Fairchild (1967). It is a species with unpatterned wings, and nothing like it was seen from the area here discussed. *Scione lurida* Enderlein was placed by Fairchild (1971) as a subspecies of *S. aurulans* Wiedemann. The 1 ectotype is labeled simply Colombia. It is an entirely pale straw colored species with unpatterned wings, and nothing like it was seen from northwestern Colombia.

Key to *Scione* Species

1. Beard and pleura dark haired, not contrasting with unpatterned dark mesonotum. Abdomen without contrasting pale hair tufts, at least the last 4 segments yellow to orange haired. Wings smoky hyaline, without pattern, shiny and wrinkled 2
- 1'. Beard and pleura white to yellowish, contrasting with dark and patterned mesonotum. Abdomen with pale median hair tufts on

- at least the last few segments. Wings with at least small clouds on crossveins 3
- 2(1). Antennae serrate, each annulus of third segment with a prominent dorsal extension (Fig. 6A-D) *serratus* n. sp.
- 2'. Antennae subulate, without teeth *rufescens*
3. At least the prothoracic legs markedly bicolored, the tibiae notably paler than the black femora 4
- 3'. Legs not markedly bicolored, generally brownish without marked contrast between tibiae and femora 6
4. Largely black species, the mesonotum with contrasting white stripes, whitish beard, and a row of middorsal white triangles on black haired abdomen. Pro- and mesotibiae reddish, femora black. Antennae and proboscis black (Figs. 4A-D, 19)
 *youngi* n. sp.
- 4'. Brown species, the mesonotum with poorly contrasting yellowish to orange stripes. At least first 2 abdominal tergites largely orange haired. Pro- and mesotibiae yellow to orange. Antennae largely orange 5
5. Abdomen dark yellow in ground color with a middorsal row of connected black integumental spots forming a stripe. Vestiture of yellow hairs with a series of white middorsal triangles. All tibiae yellow, contrasting with blackish femora. Proboscis longer than head height, the labella small and rounded (Figs. 6E-H, 22). *obscurifemorata*
- 5'. Abdomen mainly orange on first 3 segments, blackish thereafter, with faint diffuse middorsal dark spots, or none, not forming a stripe. Vestiture of orange hairs on first 3

segments, largely black thereafter and with small easily lost yellow middorsal hair tufts. Hind tibiae often darkened, not contrasting. Proboscis about head height, heavily sclerotized, the labella about a fourth its length (Figs. 7E-I, 23). *brevibeccus* n. sp.

6. Face short, not protuberant, the proboscis about head height. Legs orange yellow, the 2 prothoracic pairs with short yellow-haired tibia and femora with dense and long black hairs. Mesonotum and abdomen above densely coppery haired, the latter with a row of small median yellow hair tufts (Figs. 3E-H, 15). *cupreus* n. sp.

- 6'. Face protuberant, the proboscis clearly greater than head height, slender with long pointed labella. Legs pale to dark brown. Mesonotum and abdomen not largely coppery haired. . . 7

7. Wings mainly smoky, with yellow areas confined to a small patch below stigma and/or in basal and discal cells, the second submarginal cell (4th R) without or with but a trace of yellow at base 8

- 7'. Wings rather brightly patterned, yellow with hind and apical margins gray, and large discrete gray areas around crossveins and fork of third vein. 9

8. Brown species, the mesonotal stripes faint and without contrasting ante- and supra-alar tufts. Proboscis longer than head including frontoclypeus, slightly swollen basal of labella, and bearing 2 sparse groups of long black outstanding setae at base of labella. Yellow areas of wing reduced to a

- small irregular patch below stigma (Figs. 4E-II, 20).
. *rhinothrix* n. sp.
- 8'. Blackish species, the mesonotal stripes prominent, and with
contrasting pale haired ante- and supra-alar hair tufts.
Proboscis shorter and more slender, with a few shorter scattered
outstanding setae. Yellow areas of wing extending through
middle of discal cell and in distal third of basal cells
(Figs. 7A-D, 17). *equivexans* n. sp.
9. Frons nearly or quite parallel sided, frontal index 2.2-2.5.
Frontoclypeus shorter than eye diameter, proboscis very slender
and acutely pointed, about head height or slightly longer.
Beard snow white. Supra-alar hair tufts dull yellow to brown,
sparse. Legs yellowish brown, the hind tibiae darkened.
Abdomen irregularly brownish, paler on first 2 segments,
orange haired with white to yellowish middorsal hair tufts
(Fig. 18). *maculipennis*
- 9'. Frons markedly divergent below, index 1.5-2.1. Frontoclypeus
snout-like, equal or greater than eye diameter, the slender
proboscis longer than head height. 10
10. Frons pale tan with a large round to oval blackish brown
pollinose central spot which may touch lateral and basal
margins and ocellar tubercle. Subcallus and frontoclypeus
cinnamon brown, the latter with broad lateral gray stripes.
Thoracic stripes whitish, prominent. Wing pattern very con-
trasting, the dark areas more extensive than the yellow
(Figs. 5A-D, 21). *albifasciata*

10'. Frons orange brown, the central area slightly darker, ill-defined, not touching lateral margins. Subcallus dark orange brown with paler patches laterally. Frontoclypeus cinnamon brown, with poorly defined yellowish brown stripes at sides. Thoracic stripes yellowish, less contrasting. Wing pattern paler, the yellow areas more extensive than the dark (Figs. 5E-H, 16). *flavescens*

Scione albifasciata (Macquart)
(Figs. 5A-D, 21)

Pangonia albifasciata Macquart 1846, Mem. Soc. Roy. Sci., Agr. Arts Lille, p. 156, pl. 3, fig. 8.

Scione albifasciata: Fairchild 1942, Ann. Ent. Soc. Amer. 35(2):186, pl. 1, fig. 1. Fairchild 1956, Smithson. Misc. Coll. 131(3):10.

A medium sized yellowish brown and brown species with a well-produced face, whitish yellow beard, light brown legs, faintly patterned smoky brown and yellow brown wings and abdomen with small middorsal pale hair patches on tergites 2-5.

Female. Length 10-12mm (N=15, \bar{x} =11.5mm). Frontal index 1.5-1.9 (\bar{x} =1.75, 1SD=0.10). Head structures as figured. Frons pale yellow pollinose with a large median dark brown patch. Tubercle at vertex blackish brown pollinose, moderately raised, with 3 distinct ocelli. Frontal vestiture of numerous long dark brown hairs, quite long at the vertex. Frons divergent below, basal index 1.2-1.5 (\bar{x} =1.3). Eyes moderately dense pilose, color not noted. Subcallus and genae dark yellowish brown pollinose. The latter with a broad mesial pale

yellow area. Frontoclypeus well produced, facial index 1.1-1.3 ($\bar{x}=1.2$), dark yellowish brown pollinose with broad lateral pale brown stripes. Antennae rather slender, segments 1 and 2 yellow brown pollinose; segment 3 reddish brown; antennal hairs black. Palpal segment 1 nearly black with pale hairs basally and black hairs apically; segment 2 reddish brown. Proboscis blackish brown, wholly sclerotized, 4.1-6.1 ($\bar{x}=4.5$) times longer than frons. Beard very pale yellowish white.

Mesonotum and scutellum brown to reddish brown pollinose with pale grayish stripes laterally, along longitudinal and transverse sutures, and indistinctly along the midline. Vestiture of moderately dense brown hairs above with tufts of long white to pale yellowish hairs beginning just above wing bases and extending to either side of the scutellum. Pleura and meso- and metacoxae light brown pollinose, slightly darker on mesanepisternum, vestiture of corresponding pale yellow and brown hairs. Procoxae dark brown pollinose with blackish brown hairs. Femora and pro- and mesotibiae yellowish brown, dark-haired, pro- and mesotarsi dusky. Metatibiae and tarsi blackish brown and dark-haired. Wings indistinctly patterned as figured, smoky brown apically, along anal margin, and in large clouds around crossveins with the remainder yellowish brown.

Abdominal tergite 1 mostly yellowish brown; tergite 2 and sometimes 3 with a broad middorsal triangular blackish brown patch; remaining segments blackish brown except for pale posterior margins. Vestiture is of short brown hairs except for small middorsal pale yellow hair tufts on tergites 3-5 and sometimes 1-5. Abdomen below yellowish brown, mottled black. Vestiture of short pale yellow hairs.

Male. Not known.

Distribution. Colombia (Cauca, Huila, ?Magdalena, ?Meta, ?Putumayo).

Material examined. Colombia: Cauca; Cerro de Munchique, 2450m, mostly netted, some taken in flight traps, 4♂♂ 5 Aug. 1973, 49♀♀ 6 Aug. 1973, 3♀♀ 6 Aug. 1975, 12♀♀ 7 Aug. 1975, 16♀♀ 8 Aug. 1975; Huila; Finca Meremberg near Leticia, 2250m, flight trap with CO₂, 1♀ 26 Feb. 1976.

Discussion. The above material seems to agree with Macquart's description and with cotype "a" examined by Fairchild in the British Museum. They have in common slender antennae and a greatly produced face. Two other cotypes ("b" and "c") examined by Fairchild at the British Museum and a specimen in the U.S.N.M. from the upper Putumayo River are believed by him to be a different species which has a shorter face, stouter antennae, and longer palpi. Three specimens in the collection of G.B.F. seem to be this same species. One was compared to the Putumayo specimen and illustrated by him as *albifasciata* (1942a) and the other 2 are similar. Until more material is examined I will not attempt to name or include them in the present keys. Data from the labels of these 3 specimens are as follow: Colombia: Meta, Villavicencio, 1♀ 1920, Fr. Apollinaire-Marie; Magdalena, Vista Nieve, W San Lorenzo, 1♀ 3 Aug. 1926, Walker det.; Magdalena, NW Sierra Nevada de Santa Marta, 7-8,000ft., 1♀ 21 July 1938, Darlington (compared to homotype specimen from upper Putumayo River) of *P. albifasciata*.

Scione brevibeccus n. sp.
(Figs. 7E-I, 23)

A medium sized, robust, dark reddish brown fly with a moderately produced face, rather short proboscis, yellow beard, bicolored legs,

small yellow middorsal abdominal hair tufts and vaguely patterned pale yellow and smoky brown wings with fourth vein incomplete.

Female. Length 12mm; of wing 12mm. Head characters as figured. Frontal index 2.6; divergent below, 1.3 times wider at base than vertex. Frons yellowish brown pollinose with a large dark brown pollinose median patch beset with blackish brown hairs. Ocellar tubercle is blackish brown pollinose and bears 3 dark yellowish brown ocelli; surrounding area at vertex dark brown. Eye color not noted; densely pilose. Subcallus mostly dark brown pollinose with lateral yellowish brown areas. Genae yellowish brown and brown pollinose. Frontoclypeus moderately produced, 0.65 as long as frons is high; dark grayish brown pollinose with blackish brown hairs. Antennal segments 1 and 2 reddish brown in ground color with sparse pale yellow pollinosity; segment 3 orange brown, the last few annuli darkening to a blackish tip. Antennal hairs black. Palpi 0.60 times as long as frons height; dark reddish brown with dark brown hairs. Proboscis 2.2 times as long as frons height; wholly sclerotized, shiny blackish brown. Beard and anterior pleural hairs long and pale yellow.

Mesonotum dark reddish brown with a slightly paler middorsal line, the other usual thoracic markings pale yellow. Mesonotum beset with a moderately dense mixture of black and coppery red hairs, longer posteriorly; laterally from transverse suture to scutellum, hairs are longer, pale yellow. Scutellum blackish brown with long black and coppery hairs. Pleura and coxae grayish brown pollinose with a vestiture of dense long pale yellow hairs anteriorly, and below and around wing base, the remaining areas clothed with long blackish brown hairs. Femora blackish brown, black haired. Pro- and mesotibiae pale

yellowish brown with concolorous hairs. Pro- and mesotarsi brown to yellowish brown with concolorous hairs. Metatibiae and metatarsi dark brown, mostly dark haired with some pale yellow hairs below. Halteres, stem and base of knob dark brown, knob yellowish brown. Wings vaguely patterned as figured, pale yellow mesially and the remainder smoky brown.

Abdominal tergites 1 and 2 mostly yellowish brown, both with small median dark brown integumental spots. Segments 3-7 brown to blackish brown in ground color. Vestiture of tergites 1 and 2 dense pale orange hairs except for some dark hairs on median spots; tergites 3-7 with dense dark brown to black hairs; tergites 1-5 with small middorsal pale hair patches on posterior margins of segments. Venter of abdomen yellow brown to dark brown with some grayish pruinosity, densest on last segments; vestiture of short dark hairs.

Male. Not known.

Distribution. Colombia (Valle).

Material examined. Colombia: Holotype, ♀, Valle, Lago Calima, 8km below dam, from livestock, 8 Aug. 1975, R. Wilkerson coll. Paratypes, Valle, Lago Calima, from livestock and CO₂ baited flight trap, 5♀♀ 8 Aug. 1975, 33♀♀ 22 Aug. 1975, 60♀♀ 4 Sept. 1975, 1♀ 10 Oct. 1975, 1♀ 13 March 1976, 3♀♀ 26 March 1976, 4♀♀ 9 May 1976.

Discussion. Figured specimen is a paratype, the second palpal segment in this specimen, as in several others, is shorter and more rounded than in the holotype and the third antennal segment orange brown with terminal annuli only slightly darker. The paratypes range in length from 10-13mm (N=20, \bar{x} =11.7mm); frontal index 2.0-3.0 (\bar{x} =2.4); frons at base 1.2-1.5 times wider than at vertex (\bar{x} =1.35); face 0.5-0.7 as long as frons height (\bar{x} =0.60); proboscis 1.6-2.3 times as

long as frons height ($\bar{x}=1.9$); palpi 0.5-0.6 as long as frons height ($\bar{x}=0.54$).

Paratypes show some variation in extent of pale orange dorsal vestiture. Tergite 3 may be wholly orange haired or a mixture of black and orange, tergite 4 of some specimens has orange hairs on the posterior margin.

The name refers to the relatively short "beak" of this species.

Sciome cupreus n. sp.
(Figs. 3E-H, 15)

A medium sized robust reddish brown species with a short face, and short heavy proboscis, yellowish beard and pleural hairs, unicolorous yellowish brown legs, orange haired abdomen with small middorsal yellow hair patches, and vaguely marked pale yellow and smoky brown wings with an incomplete fourth vein.

Female. Length 13mm; of wing 13mm. Head structures as figured. Frontal index 2.3, frons 1.2 times wider at base than at vertex. Frons with pale yellow pollinose borders and a large median dark brown pollinose patch which extends to the vertex. Ocellar tubercle blackish brown, raised, with 3 distinct brownish ocelli. Frontal vestiture of numerous long hairs, those on the upper three fourths dark shiny brassy, declinate; on the lower fourth black, erect. Eyes densely pilose, color not noted. Subcallus dark brown pollinose with pale yellowish brown lateral patches. Genae pale grayish brown. Frontoclypeus only slightly produced, 0.60 as long as frons is high; pale reddish brown in ground color with pale brown pollinosity; vestiture of black hairs. Antennal segments 1 and 2 brown with pale yellow

pollinosity and black hairs; segment 3 orange brown, the last few annuli slightly darker. Palpi reddish brown, mainly black haired, but with some basal hairs of the first segment pale yellow. Proboscis twice as long as frons height, wholly sclerotized shiny blackish brown. Beard of long dense pale yellow hairs.

Mesonotum dark reddish brown with the usual pale yellow marks. Vestiture mostly of numerous long shiny coppery red hairs except for tufts of long pale yellow hairs laterally from the wing base to the scutellum. Scutellum dark reddish brown with long shiny coppery red hairs. Pleura and coxae light brown in ground color, grayish pollinose. Pleural vestiture of long pale yellow hairs around wing base, changing to yellowish brown toward the middle. Coxal hairs blackish brown, quite numerous, long, and dense on procoxae. All femora and whole hind leg yellowish brown, mostly dark haired. Pro- and mesotibiae and tarsi pale yellowish brown and pale yellow haired. Halteres pale yellowish brown. Wings vaguely patterned as figured, pale yellow anteriorly and mesially, the rest smoky brown; the fourth vein incomplete.

Abdomen above reddish brown with concolorous pollinosity, the last few segments somewhat darker. Dorsal vestiture of numerous short orange hairs with small middorsal pale yellow hair patches on tergites 1-5. Below abdomen mottled dark reddish brown with numerous short black hairs.

Male. Not known.

Distribution. Colombia (Cauca).

Material examined. Colombia: Holotype, ♀, Cauca, Cerro de Munchique, 2450m, flight trap, Wilkerson and Young coll.

Discussion. *S. cupreus* is quite similar to *S. brevithecus* in overall body and hair coloration, wing pattern, and in having a fourth vein which does not reach wing margin. *S. cupreus* however is more robust, has brassy not black frontal hairs, more extensive yellow pleural hairs, nearly unicolorous brownish legs instead of dark femora, and abdomen above wholly orange haired instead of only the first 1 or 2 segments.

The name refers to the extensive shiny coppery hairs on the dorsum of this species.

Scione equivexans n. sp.
(Figs. 7A-D, 17)

A medium sized dark brown species with a well produced face, long proboscis, white beard, thinly white striped thorax, unicolorous dark brown legs, and faintly marked pale yellow and smoky brown wings.

Female. Length 12mm; of wing 12mm. Head structures as figured. Frontal index 1.84; 1.45 times wider at base than at vertex. Frons with a pale yellow pollinose border and a large median dark brown pollinose patch; vestiture of numerous long black hairs. The raised ocellar tubercle bears 3 pale ocelli. Eyes densely pilose, deep bronze in color. Subcallus dark brown pollinose. Frontoclypeus and genae dark brown pollinose with a pale lateral stripe through both; vestiture of face black. Face as long as frons is high. Antennal segments 1 and 2 dark brown pollinose, black haired, segment 3 dark reddish brown, the last few anulli slightly darker. Palpal segment 1 blackish, segment 2 dark brown. Proboscis subshiny blackish brown, wholly sclerotized, 3.6 times longer than frons height. Beard of numerous long white hairs.

Mesonotum dark brown with an indistinct pale middorsal line, the other usual thoracic lines pale yellowish brown with concolorous pollinosity. Vestiture of mesonotum a mixture of numerous shiny pale reddish yellow and black hairs; laterally with numerous long white hairs beginning at wing base and extending to scutellum. Scutellum dark brown with long black and shiny pale reddish yellow hairs as on mesonotum. Pleura brown in ground color, brown to pale grayish brown pollinose, vestiture of long white hairs around wing base, a tuft of black hairs on the mesoanepisternum, the remainder beset with less numerous brown hairs. Procoxae dark brown covered with numerous long dark brown hairs. Other coxae as pleura. Remaining leg segments brown, the hind pair darker. Leg vestiture of blackish brown hairs. Stem of halteres yellowish brown, knob brown. Wings vaguely patterned, as figured, pale yellow along leading edge and mesially, the remainder smoky brown.

Abdomen above dark brown, tergites 1 and 2 with some irregular yellowish brown areas. Vestiture of numerous short black hairs, segments 1-6 with small middorsal and lateral silvery white hair patches. Abdomen below pale yellowish brown with some blackish mottling laterally. Sternites 2-6 with wide cream colored posterior border. Vestiture below a mixture of sparse very short and long black hairs with pale yellow hairs along segmental borders.

Male. Not known.

Distribution. Colombia (Valle, Cauca).

Material examined. Colombia: Holotype, ♀, Valle, Penas Blancas, 1750m, 10km W Cali, horse bait, 8 Jan. 1975, R. Wilkerson coll. Paratypes; Valle; Penas Blancas, mostly from livestock, some netted and

in flight traps, 27⁰⁰ 1-7 Aug. 1973, 1⁰ 30 Dec. 1974, 105⁰⁰ Jan. 1975, 44⁰⁰ Feb. 1975, 12⁰⁰ March 1975, 10⁰⁰ April 1975, 30⁰⁰ May 1975, 88⁰⁰ June 1975, 35⁰⁰ June 1975, 35⁰⁰ July 1975, 17⁰⁰ Aug. 1975, 4⁰⁰ Sept. 1975, 28⁰⁰ Oct. 1975, 1⁰ Nov. 1975, 7⁰⁰ Jan. 1976, 41⁰⁰ Feb. 1976, 66⁰⁰ March 1976, 7⁰⁰ April 1976; Bajo Calima, 10km E. Buenaventura, 1⁰ 20 Aug. 1975; 3.6km W Queremal, 1130m, 1⁰ 14 Feb. 1976; Cauca; Cerro de Munchique, 10⁰⁰ 5-7 1973, 7⁰⁰ 6-8 Aug. 1975, 2⁰⁰ 16 Jan. 1976; La Pena del Perro, Cerro Torre, 2180m, Barreto coll.

Discussion. The above description of a specimen from Penas Blancas is representative of material from this area and Cerro de Munchique in Cauca. These differ in measurable characters as follows. Length 10-12mm (N=20, \bar{x} =11.3mm). Frontal index 1.9-2.2 (\bar{x} =2.0). Frons 1.1-1.5 times wider at base than vertex (\bar{x} =1.3). Face 0.7-1.0 times longer than frons height (\bar{x} =3.5). Palpi 0.7-0.9 as long as frons height (\bar{x} =0.75).

In other respects the paratypes differ most markedly in the color of the beard and thoracic and abdominal hair patches from white to gray to pale yellow. In addition the beard and pleural hairs may be quite dense to sparse. In some specimens the pale markings on the longitudinal sutures reach the posterior border.

A population not included directly in the above description nor given paratype status, is that from Lago Calima and Rio Bravo - Playa Rica. These are quite similar but differ in the following manner. The proboscis on the average is shorter 2.8 vs. 3.5 times frons height (ISD for these are 0.35 and 0.33 respectively). The palpi are shorter, 0.60 vs. 0.75 (ISD=.06 for both). The overall coloration is somewhat paler with more of a yellowish hue. The wings are more

opaque and also more yellowish. Further study is necessary to elucidate the status of this group.

Scione equivexans is similar to *Scione albifasciata* (Macquart), *S. maculipennis* (Schiner) and *S. youngi* n. sp. Refer to the accompanying key for their discrimination.

As many specimens were caught biting horses the name here assigned refers to their appetite for horse blood.

Scione flavescens Enderlein
(Figs. 5E-H, 16)

A small to medium dull brown species with a well produced face, long thin proboscis, pale yellow beard, unicolorous brownish legs, faintly patterned wings with smoky brown vein margins and crossveins, and small middorsal abdominal yellow hair patches.

Female. Length 9-11mm (N=20, \bar{x} =10.1mm). Frontal index 1.7-2.1 (\bar{x} =1.9). Frons divergent below, 1.2-1.5 (\bar{x} =1.3) times wider than vertex. Head structures as figured. Frons yellowish brown pollinose with an indistinct brownish median pollinose patch. Ocellar tubercle bearing 3 distinct dark ocelli slightly raised, blackish. Frontal vestiture of dark brown hairs below, black hairs at vertex. Eyes densely pilose; color not noted. Subcallus brown pollinose, slightly paler laterally. Genae brown to yellowish brown pollinose. Frontoclypeus brown pollinose with lateral pale stripes; vestiture of dark brown hairs. Face well produced, 0.8-1.1 (\bar{x} =1.0) times as long as frons height. Antennal segments 1 and 2 yellowish brown with sparse pale yellow pollinosity, segment 3 orange brown; antennal hairs black. Palpi yellowish brown, black haired except for a few pale

yellow hairs at the base of segment 1. Proboscis wholly sclerotized shiny dark reddish brown, 3.5-4.4 ($\bar{x}=3.9$) times as long as frons height. Beard of long but not numerous pale yellow hairs.

Mesonotum and scutellum brown pollinose with the usual pale grayish yellow markings. Vestiture a mixture of numerous pale brassy and brown hairs, those laterally, posteriorly, and on scutellum quite long. Hair tufts from just in front of wing base to the scutellum are long, numerous, and pale yellow to yellowish brown. Pleura and coxae brown to grayish brown pollinose with long dense pale yellow hairs around wing base, the remainder a mixture of more sparse dark brown and pale yellow hairs. Procoxae with long dark brown hairs. Other leg segments yellowish brown, the metatibiae and metatarsi dark brown. Leg hairs brown to blackish brown. Halteres pale yellowish brown. Wing as figured, pale yellow costally and mesially, the remainder including clouds on crossveins smoky brown.

Abdomen above dark yellowish brown, the first 2 segments paler. Vestiture primarily of numerous pale orange brown hairs with small middorsal patches of shiny yellow brown hairs on tergites 1-6. Abdomen below pale yellowish brown, the last segments darker; vestiture of rather long pale yellow hairs.

Male. Not known.

Distribution. Colombia (Valle, Cauca), Ecuador (Santa Inez).

Material examined. Colombia: Valle; Lago Calima, 5 miles below dam, 1250m, flight trap baited with CO₂, 1♀ 13 March 1976; Lago Calima and Rio Bravo, mostly from livestock but also netted and from flight traps, 1♀ 8 March 1975, 16♀♀ July 1975, 38♀♀ Aug. 1975, 22♀♀ Sept. 1975, 5♀♀ 21 Nov. 1975, 20♀♀ 19 Dec. 1975, 14♀♀ 17 Jan. 1976, 12♀♀ 2 Jan. 1976, 13♀♀ 3 Feb. 1976, 9♀♀ 13 March 1976, 9♀♀ 26 March 1976,

1♂ 8 April 1976, 16♀♀ 9 April 1976, 3♀♀ 24 April 1976; Penas Blancas, 1♂ 26 April 1976; Cauca; Cerro de Munchique 1♀ 5 Aug. 1973, Cerro de Munchique, 2♀♀, El Somadero, Finca Carpinteria, 2600m, Barreto and Trapido coll.

Discussion. Determination of this species was made possible by Fairchild's (1966a) notes on the type.

The specimen from Penas Blancas, although dirty, is darker and larger overall, the metafemora as well as metatibiae and tarsi are dark brown, and the dorsal abdominal hairs are brown instead of orange brown. The Munchique specimens, although a bit paler, agree well with the above description.

S. flavescens is quite similar to *S. maculipennis*; see key for distinguishing characters.

Scione maculipennis (Schiner)
(Fig. 18)

Dielisa maculipennis Schiner 1868, Reise Novara, Zool., II, Abt. 1, Vol. B, Dipt., p. 102, pl. II, figs. 7, 7a, ♀, South America. Fairchild 1967, Pacific Ins., 9(2):248, fig. 7.

Scione maculipennis: Fairchild 1942, Ann. Ent. Soc. Amer., 35(2):189-190, pl. 1, fig. 5, full references.

A medium sized yellowish brown to brown species with a pale yellow beard, yellowish brown legs, faintly patterned smoky brown and light yellow wings, and abdominal hairs pale yellow except for small middorsal whitish hair tufts.

Female. Length 9-11mm (N=20, \bar{x} =10mm). Frontal index 2.2-2.5 (\bar{x} =2.4, ISD=0.12). Base of frons 0.9-1.2 times as wide as vertex (\bar{x} =1.06). Frons light yellow brown pollinose with a diffuse central

brownish patch. Frontal vestiture of long brown hairs. Ocellar tubercle slightly raised, bearing 3 distinct dark brown ocelli. Eyes densely and moderately long pilose; color in life dull greenish black (Fairchild, pers. comm. 1978). Subcallus dark brown pollinose. Genae grayish brown pollinose. Frontoclypeus brown pollinose with slightly paler lateral stripes, vestiture is of sparse but evenly distributed brown hairs. Face 0.6-0.8 (\bar{x} =.67) height of frons. Antennal segments 1 and 2 yellowish brown; segment 3 reddish brown, the last few annuli darker on some specimens. Palpi reddish brown, pointed, usually about 4 times longer than wide. Proboscis slender, blackish brown and wholly sclerotized; 2.0-3.2 (\bar{x} =2.6, 1SD=0.22) times as long as height of frons. Beard pale yellowish white to light yellow.

Mesonotum with dark brown to reddish brown ground color and with quite pale grayish stripes laterally and on longitudinal sutures. Vestiture of sparse brown and reddish brown hairs except for tufts of long bright yellow to white hairs on either side of the scutellum. Pleura and coxae brown in ground color and pale yellow pollinose; hairs mostly pale yellow with a few brownish hairs on mesoanepisternum. Femora light reddish brown, dark haired. Pro- and mesotibiae light yellowish brown, tarsi dusky; vestiture of short dark hairs. Metatibiae and metatarsi brown to blackish brown, dark haired. Wings faintly patterned; smoky brown apically, on crossveins, and usually paler in posterior cells; the remaining areas light yellowish brown. Some specimens are quite faintly marked, others distinctly so.

Abdomen yellowish brown dorsally, vestiture of short black hairs except for some pale yellow hairs on segmental margins and small

middorsal white patches on tergites 2-5. Venter light yellowish brown with short pale hairs.

Male. Not known.

Distribution. Costa Rica to Venezuela. Colombia (Choco, Valle, Meta, Cauca, ?Cundinamarca).

Material examined. 1[♀] determined by Schiner in 1869 and compared to the type by G. B. Fairchild, labeled Brasilia, but the species not known definitively from that country. Panama, 30^{♀♀}. Costa Rica, 3^{♀♀}. Colombia: Valle; Lago Calima, mostly from livestock but some netted and taken in flight traps, 54^{♀♀} 16-17 July 1975, 7^{♀♀} 25 July 1975, 100^{♀♀} 8 Aug. 1975, 34^{♀♀} 22 Aug. 1975, 53^{♀♀} 4 Sept. 1975, 2^{♀♀} 13 March 1976, 1[♀] 26 March 1976, 1[♀] 9 April 1976, 1[♀] 24 April 1976; "Rio Bravo - Playa Rica," 6^{♀♀} 17 Jan. 1976, 5^{♀♀} 3 Feb. 1976; Penas Blancas, 2^{♀♀} 25 Aug. 1975, 2^{♀♀} 2-3 Sept. 1975, 1[♀] 22 March 1976; T. V. Tower Mt., 1[♀] 8 Aug. 1973; Carrazo, Calvache, 1[♀] Feb. 1972; Cauca; Munchique, 3^{♀♀} 11 July 1969, R. H. Dressler coll.; La Pena del Perro, Cerro Torres, 2180m, Barretto coll.; Meta; Villavicencio, 3^{♀♀} 1924, Fr. Apollinaire-Marie; ?Cundinamarca, Bogota, 2^{♀♀}.

Discussion. The Colombian and Panamanian specimens which agree with the above description also match fairly well the Schiner determined homotype. As mentioned in the description, a good deal of variation exists in degree of divergence of the frons, length of face, and most importantly, since it first meets the eye, the color of the beard and pale thoracic hairs which vary from nearly white to yellow. However, there appears to be no consistent correlation of differences and characters and I believe all the specimens to be conspecific. More material from other localities, males, larvae, and biological data is needed for clear definition of this and other *Scione* species.

Bequaert and Renjifo (1946) report *S. maculipennis* from the Choco, La Union and Meta, Restrepo.

Scione obscurefemorata Krober
(Figs. 6E-H, 22)

Scione obscurefemorata Krober 1930, Stettin. Ent. Ztg. 91:172,
♀, Colombia, ♂, Peru. Fairchild 1967, Studia Ent., Sao Paulo, 9(1-4):
355, fig. 12.

A medium to small species with a short face and proboscis, pale yellow beard, blackish brown and grayish striped thorax, bicolored blackish brown and yellowish brown legs, hyaline wings with brownish vein margins and crossveins, and abdomen above yellow with a black middorsal stripe.

Female. Length 10-11mm. Head structures as figured. Frontal index 1.8-2.3 (N=5, \bar{x} =2.0). Frons divergent below, 1.2-1.6 (\bar{x} =1.5) times wider at base than at vertex. Frons with a large median blackish brown pollinose patch surrounded by dark yellowish brown pollinosity. Vertex and raised ocellar tubercle also blackish brown pollinose; tubercle with 3 distinct dark brown ocelli. Frontal vestiture numerous long dark brown hairs. Eyes moderately densely pilose; color not noted. Subcallus brown pollinose mesially, yellowish brown laterally. Genae yellowish brown to brown pollinose. Frontoclypeus pale brown to yellowish brown pollinose mesially, paler laterally; vestiture of black hairs. Face not greatly produced, 0.5-0.73 (\bar{x} =0.66) times as long as frons height. Antennal segments 1 and 2 yellowish brown with sparse pale yellow pollinosity; segment 3 orange brown; antennal hairs black. First palpal segment blackish; segment 2 orange brown with a blackish

border; palpal hairs black. Proboscis short, wholly sclerotized shiny blackish brown, 1.7-2.7 times longer than frons height ($\bar{x}=2.1$). Beard, anterior pleural, and basal procoxal hairs pale yellowish brown.

Mesonotum dark blackish brown marked by yellowish brown stripes on the midline, longitudinal and transverse sutures, and laterally. Mesonotal vestiture a mixture of numerous black and pale coppery hairs with patches of long pale yellow hairs from the wing base to the scutellum. Scutellum as mesonotum. Pleura and coxae gray pollinose, vestiture primarily long pale yellow hairs with a few black hairs on the mesoanepisternum and on apices of procoxae. Femora grayish brown with a mixture of pale yellow and black hairs. Tibiae and tarsi yellowish brown, mostly pale yellow haired. Halteres brown. Wings vaguely marked as figured pale yellow costally, the remainder smoky brown.

Abdomen above mottled blackish brown on yellowish brown, the last segments darker. Middorsally is an irregular nearly parallel sided blackish stripe about one-fourth abdominal width. Vestiture a mixture of short, numerous pale yellow and black hairs, the pale hairs most numerous on tergites 1 and 2 and on the posterior borders of 2-5. Tergites 1-6 with small middorsal pale hair patches. Abdomen below pale yellow with some black mottling, darker on last few segments. Vestiture long and numerous mostly pale yellow hairs with a few mesial black hairs.

Male. Not seen by me.

Distribution. Ecuador, Colombia (Cauca, Antioquia).

Material examined. Ecuador: Imbabura; Nangulvi, Leon coll. (compared with ♀ type of *S. obscurefemorata*). Colombia: Cauca;

Cerro de Munchique, 3♂♂ 11 June 1969, R. L. Dressler coll.; Cerro de Munchique, 2450m, netted, 1♀ 7 Aug. 1975; Antioquia; Sonson, 2400m, 1♀ 14 June 1969, R. L. Dressler coll.

Discussion. Of the specimens examined, 2 of those from Cauca, and the 1 from Antioquia have insect damaged or missing abdomens but head and thoracic characters intact. One specimen from Munchique has a more diffuse middorsal black stripe.

The original description is of a female from "Cordillera von Columbein, terra templada." The specimen from Ecuador compared to the type of *S. obscurefemorata* by Fairchild in 1964 was found by him to be in fair agreement except for having more hairy and shorter palpi and a broader abdominal stripe. The other specimens from Colombia in fact do agree fairly well with respect to the palpi and with the illustration of the type by Fairchild (1967). There seems to be a good deal of palpal variation from the quite short nearly porrect palpi of the Ecuadorian specimen, to the intermediate length of the holotype, to the longer more pointed Colombian material here described.

All specimens here key to *S. obscurefemorata* in Krobers' (1930) key except they do not have black lateral hair patches as Krober describes in his final couplet.

Scione rhinothrix n. sp.
(Figs. 4E-H, 20)

A medium sized brown species with a long proboscis and face, white beard and pleural hairs unicolorous pale brown legs, thorax and abdomen indistinctly marked except for small middorsal pale abdominal hair tufts, and wings faintly marked pale yellow and smoky brown.

Female. Length 13mm; of wing 14mm. Head characters as figured. Frontal index 2.9 only slightly divergent below. Frons with a pale yellowish brown pollinose border and large median brown pollinose patch. Ocellar tubercle only slightly raised and bears 3 distinct yellowish brown ocelli. Frontal vestiture of numerous dark brown hairs. Eyes very densely pilose; eye color not noted. Subcallus, genae, and frontoclypeus all brown pollinose with sparse, thin brown hairs. Face well produced, nearly as long as frons height. Antennal segments 1 and 2 yellowish brown, segment 3 dirty orange brown; sparsely pale yellow pollinose and black haired. Palpal segment 1 blackish brown, segment 2 brown with a blackish brown border; vestiture of blackish hairs with a few long white hairs at the base of the first segment. Proboscis wholly sclerotized shiny blackish brown with small clumps of bristles on either side just above the labella. Beard, anterior hairs of the pleura, and bases of procoxae with long, dense, white hairs.

Mesonotum brown, pale yellowish brown pollinose, indistinctly marked with pale yellow pollinosity along midline, longitudinal sutures, and laterally. Vestiture of numerous brown and dark brown hairs. Scutellum concolorous with mesonotum. Pleura and coxae brown in ground color, pale gray pollinose with numerous long pale yellow and sparse dark brown hairs. Legs yellowish brown, the tarsi and hind tibiae dusky. Leg hairs brown to dark brown. Halteres yellowish brown. Wings faintly patterned as figured, pale yellow costally, the remainder smoky brown.

Abdomen dark yellowish brown with concolorous pollinosity. Vestiture of quite numerous short brown hairs with small middorsal

pale yellow tufts on tergites 1-6. Below abdomen mottled yellowish brown and black with sparse pale yellow pollinosity and sparse pale yellow hairs.

Male. Not known.

Distribution. Colombia (Valle).

Material examined. Colombia: Holotype, Valle, Penas Blancas, 1750m, 10km W Cali, from bait horse, 16 July 1975, R. Wilkerson coll. Paratypes, Valle, Penas Blancas, as above from the following dates, 1♂ 12 May 1975, 1♂ 9 June 1975, 1♂ 26 June 1975, 4♀♀ 10 July 1975, 3♀♀ 5 Aug. 1975, 3♀♀ 11 Aug. 1975, 1♂ 21 Aug. 1975, 1♂ 2 Sept. 1975, 3♀♀ 3 Sept. 1975, 1♀ 5 May 1976.

Discussion. All the paratypes agree well with the above description. They vary little in length, all being about 13mm. Frontal indices range from 2.3-2.8 (\bar{x} =2.5). The proboscides range from 3.1-5.8 (\bar{x} =3.9) times longer than frons height.

A paratype was captured during a biting count from a horse on 26 June 1975 at 0625hrs. It was taken from the belly during sunny conditions, temp. 18°C, RH 73%.

The name "nose bristle" refers to the small setal tufts on either side of the proboscis.

Scione rufescens (Ricardo)

Erephrosia rufescens Ricardo 1900, Ann. Mag. Nat. Hist., (7)6:294, Peru, Bolivia. Fairchild 1956, Smiths. Miscel. Coll., 131(3):27.

Fidena fulvosericæa Krober 1931, Zool. Anz., 95:26, fig. 11, ♀, Colombia.

Scione aureopygia Fairchild 1942, Ann. Ent. Soc. Amer., 35(2): 186-188, pl. 1, fig. 4, ♀, Panama.

Scione rufescens: Fairchild 1971, Cat. S. Amer. Dipt., fasc. 28, p. 27, synonymy.

A medium to large sized reddish brown species with blackish brown beard and pleura, broad sabre shaped palpi, reddish brown legs, unpatterned yellowish brown wings, and yellow hairs on abdominal tergites 2-6.

Female. Length 12-17mm (N=9, \bar{x} =13.8mm). Frontal index 2.3-3.1 (\bar{x} =2.8). *S. rufescens* is nearly identical to *S. serratus* n. sp. except for having 8 annulate tapering antennae, typical of other *Scione* instead of serrate antennae. See that section for the description of *S. serratus*.

Male. Not known.

Distribution. Costa Rica to Bolivia. Colombia (?Choco or Antioquia).

Material examined. 10^{♀♀} Panama (including one compared to types of *S. rufescens*, *Fidena fulvosericata*, and *Rhinotriclista generosa* Enderlein).

Discussion. I did not see specimens from Colombia and the only Colombian record in the literature is the type of *Fidena fulvosericata* from "Darien, Colombia." This could either be in the departments of Choco, Antioquia, or in present-day Panama, since the type may have been collected before the separation of Panama and Colombia.

Fairchild (unpublished, 1978) reports that he observed *rufescens* in Panama from the lowlands up to 4800ft. in areas of heavy forest and high rainfall. He found the species attracted to man and to the

heat but not the light of a gasoline lantern hung in a Shannon trap during the half hour or so just before dusk and just after dawn at ground level. Many of the specimens were filled with a clear sweet liquid.

Scione serratus n. sp.
(Figs. 6A-D)

A medium to large reddish-brown fly with serrate antennae, blackish brown beard and pleural hairs, brownish legs, unpatterned yellowish brown wings, and shiny yellow hairs on abdominal tergites 2-7.

Female. Length 15mm; of wing 15mm. Head structures as figured. Frontal index 2.6. Frons wholly dark reddish brown pollinose with a few medium length dark brown hairs. Three distinct ocelli present on a slightly raised tubercle at vertex. Eyes densely short pilose; color not noted. Subcallus, genae, and frontoclypeus dark yellowish brown pollinose with dark brown hairs on the subcallus in broad bands above the antennal bases and a few laterally on the genae below the antennal bases. Genae just above base of palpi and tip of frontoclypeus sub-shiny where dark brown ground color shows through. Antennal segments 1 and 2 yellowish brown, black haired; segment 3 serrate as figured, dark reddish brown, covered with short, fine, light yellow hairs. Palpi dark yellowish brown pollinose, dark haired. Proboscis two-thirds again as long as head. Labrum shiny black basally changing to yellow brown apically, labium yellow, partly coiled and apparently poorly sclerotized, labella reddish brown. Beard rather sparse and blackish brown.

Mesonotum with a dark reddish brown ground color and dark yellowish brown pollinosity, slightly lighter laterally. Scutellum reddish

brown, subshiny. Mesonotal vestiture of many short black hairs, longer laterally and behind wing base. Pleura and coxae dark yellowish brown pollinose, black haired. Femora dark reddish brown, black haired. Pro- and mesotibiae and tarsi yellowish brown with short concolorous hairs. Metatibiae and tarsi reddish brown with concolorous hairs. Halteres yellowish brown, base of knob dusky. Wings unpatterned, wholly yellowish brown, slightly darker along costal margin, base of marginal cell clear. Venation as typical for the genus, first and fourth posterior cells petiolate. Membrane of wing distinctly and finely wrinkled.

Abdominal ground color above yellowish brown mottled with black, segments 3-6 lighter with broad yellowish apical bands. Vestiture above is of short black hairs on segment 1 and 2 and shiny yellow hairs on the apical margin of segment 2 and covering, except for rubbed areas, all of remaining segments. Sternite 1 dark reddish brown with short black hairs. Sternites 2-5 dark brown with broad dark yellowish apical borders. Sternite 6 yellow. Vestiture of many short dark hairs except for some yellow hairs on sternites 4 and 5 and a wholly yellow haired sternite 6.

Male. Not known.

Distribution. Colombia (Valle).

Material examined. Colombia: Holotype, ♀, Valle, "Rio Bravo - Playa Rica," 15km below dam at Lago Calima, from livestock, 3 Feb. 1976, R. Wilkerson coll. Paratypes with same data, 1♀ 19 Dec. 1975, 1♀ 2 Jan. 1976, 16♀♀ 17 Jan. 1976, 9♀♀ 3 Feb. 1976. Paratype, ♀, Valle, Lower Anchicaya, 400m, flight trap, 26 Jan. 1976, R. Wilkerson coll.

Discussion. Paratypes range in length from 13-166mm (\bar{x} =14.6mm) and have frontal indices of from 2.5-3.0 (\bar{x} =2.7). The paratypes match fairly well the above description. Head and thoracic coloration varies from brown to very dark reddish brown. Abdominal coloration in some is much paler above and most specimens have tergites 2-6 entirely yellow haired, though several specimens have shiny orange yellow abdominal hairs.

S. serratus is nearly identical to *Scione rufescens* (Ricardo) except for the unique serrate antennae of the former, recalling those of *Pityocera* (*Elaphella*) except for lack of the long basal spine.

The name is Latin for saw toothed, referring to the structure of the antennae.

Scione youngi n. sp.
(Figs. 4A-D, 19)

A medium sized dark brown robust species with a short proboscis and face, pale yellow beard, thorax marked with pale stripes and pale yellow hair tufts, legs indistinctly bicolorous, brown and blackish brown, wings vaguely patterned pale yellow and smoky brown, and abdomen with middorsal pale hair tufts.

Female. Length 11mm; of wing 12mm. Head structures as figured. Frontal index 2.5. Frons dark brown in ground color with a pale grayish yellow pollinose border and large blackish brown median pollinose patch. Frons slightly divergent below, 1.2 times wider at base than vertex. The raised subshiny black ocellar tubercle bears 3 distinct reddish brown ocelli. Frontal vestiture of long blackish brown hairs. Eyes densely pilose; eye color not noted. Subcallus

blackish brown in ground color, somewhat showing through yellowish brown pollinosity mesially above antennal bases but pale yellow laterally. Genae yellowish brown to pale grayish yellow pollinose. Frontoclypeus dark brown in ground color, primarily sparsely grayish brown pollinose except below antennal insertions where it is pale gray pollinose. Face 0.7 times longer than frons height. Facial hairs blackish brown. Antennae dark brown with some sparse pale grayish pollinosity and black hairs. Palpi half as long as frons height. First palpal segment blackish, the second segment dark reddish brown; vestiture pale yellow hairs basally on first segment the remaining hairs black. Proboscis wholly sclerotized shiny blackish brown, 2.3 times longer than frons height. Beard of long dense pale yellow hairs.

Mesonotum dark brown with the usual markings pale gray. In addition there are also vague pale patches sublaterally just anterior to the scutellum. Mesonotal vestiture a mixture of pale coppery red and black hairs longer and more numerous posteriorly with patches of long dense pale yellow hairs laterally from the wing base to the scutellum. Pleura dark brown pollinose with long dense pale yellow hairs around wing base, behind head, and a less dense mixture of pale yellow and black hairs on the remainder. Coxae dark brown, sparsely grayish pollinose with blackish brown hairs, especially dense on procoxae. The remainder of the leg segments blackish brown except for paler reddish brown pro- and mesotibiae. Leg hairs blackish brown. Halteres with a yellowish brown stem and blackish brown knob. Wings as figured pale yellow costally and mesially, the remainder smoky brown including vein borders.

Abdominal tergites 1 and 2 reddish brown, slightly mottled with black, and marked with indistinct median blackish patches. The remaining segments blackish brown. Dorsal vestiture of numerous short blackish brown hairs with small pale yellow patches middorsally and laterally on segments 1-6. Abdominal venter mottled dark yellowish brown and blackish brown. Vestiture mostly black with a few pale yellow hairs.

Male. Not known.

Distribution. Colombia (Valle).

Material examined. Colombia: Holotype, ♀, Valle, Penas Blancas, 10km W Cali, from bait horse, 9 June 1975, R. Wilkerson coll. Paratypes; same data as above, 2♀♀ 9 June 1974, 1♂ 26 June 1975.

Discussion. *Sciome youngi* is similar to *S. equivexans*, *S. brevibeccus*, and *S. cupreus*. Refer to the key for distinguishing characters.

The paratypes all agree quite well with the above description. Lengths: 12mm, 12mm, and 13mm. Frontal indices 2.4, 2.4, and 2.3. Base of frons 1.3 times wider than vertex of all 3. Face 0.6, 0.7, and 0.7 as long as frons height. Proboscis 1.9, 1.9, and 2.3 as long as frons height.

One paratype was caught during a horse baited biting study at 1120hrs during sunny weather, temp 21°C, RH 72%.

This species is named in honor of Dr. David G. Young, my companion on my first trip to Colombia.

Genus *Pityocera* Giglio Tos

Pityocera Giglio Tos 1896, Boll. Mus. Zool. Anat. Comp.

R. Univ. Torino, 11(224):3, fig. 1. Fairchild 1969, Arq. Zool. S. Paulo, 17(4):203-204.

The genus *Pityocera* is characterized by a shiny well produced face, third antennal segment with projections or hair tufts on at least one annulus, and the first posterior cell is closed with a very long petiole. The two Colombian species have pectinate and bipectinate antennae. The 2 subgenera represented here, *Pityocera* and *Elaphella*, are separated by antennal characters.

The genus is similar to *Fidena* species but differs in antennal and wing characters.

Key to *Pityocera* Species

1. Antennae bipectinate, with long dorsal and ventral processes
 on all annuli of third segment (*Pityocera*) *festae*
- 1'. Antennae pectinate, with only dorsal processes on all annuli
 of third segment, that of the basal annulus quite long. . . .
 (*Elaphella*) *cervus*

Pityocera (*Elaphella*) *cervus* (Wiedemann)

Fangonia cervus Wiedemann 1828, Auss. zweifl. Ins., 1: xxxii,
608pp., p. 94.

Elaphella cervus: Kroeber 1930, Zool. Anz., 88:390, fig. 4.

Pityocera (*Elaphella*) *cervus*: Fairchild 1971, Cat. S. Amer. Dipt.,
Fasc. 28, p. 28, synonymy.

A medium to large brownish species with pectinate antennae, shiny and bulbous frontoclypeus, and unpatterned smoky brown wings.

Female. Length 9-14mm (N=13, \bar{x} =11.7mm). Frontal index 2.5-3.2 (\bar{x} =2.8). Frons dark brown pollinose with moderately abundant short brown hairs. Eyes densely short pilose, color not noted. Subcallus reddish brown pollinose. Genae pale yellowish brown pollinose. Frontoclypeus with upper half shiny brown, lower half subshiny pale yellow. Antennae pale reddish brown, third segment pectinate with first annulus extending forward to about fourth annulus. Palpi pale reddish brown, leaf like and elongated. Proboscis dark reddish brown, about 4 times longer than height of frons. Beard pale yellowish brown.

Mesonotum and scutellum brown pollinose with numerous short brown hairs. Pleura and coxae pale yellowish brown pollinose with concolorous hairs. Legs yellowish brown with concolorous hairs. Wings uniformly smoky brown with a wrinkled texture. First posterior cell closed by a forward bending of M_1 , long petiolate; fork of third vein with a short appendix.

Abdomen dirty yellowish brown above with numerous short black hairs. Abdomen below pale yellow with numerous short yellow hairs.

Male. Not known.

Distribution. Surinam, Guyana, N Brazil, Peru, Colombia (Meta), E Bolivia.

Material examined. Surinam, 4♀♀. Peru, 1♀. Bolivia, 1♀ (compared with type by G. B. Fairchild). Brazil, 2♀♀. Colombia: Meta; Villavicencio, Bosque Ocoa, 1♀, 14 Oct. 1941; Lago El Dorado, Rio Vaupes,

attacking man on leg, 5-5:30AM, 1♀ Nov. 1968, F. Medem coll;
Villavicencio, Trampa Ocoa, 1♂, 6 Oct. 1942.

Discussion. *P. cervus* is reported from east of the Andes only. *P. festae* is quite similar to *P. cervus* but has bipectinate antennae. Its crepuscular habits may also be similar since one of the above specimens reported above was caught attempting to bite man at 0530hrs.

Pityocera (Pityocera) festae Giglio Tos

Pityocera festae Giglio Tos 1896, Boll. Mus. Zool. Anat. Comp. R. Univ. Torino 11 (224):3, fig. 1, ♀, Panama. Fairchild 1942, Ann. Ent. Soc. Amer., 35(2):183-184, fig. 7, ♀, full references.

A medium to large dark brown species with remarkable bipectinate antennae, yellowish brown beard, unicolorous yellowish brown legs, and unpatterned, uniformly smoky brown wings.

Female. Length 11-14mm (N=10, \bar{x} =13.0mm). Frontal index 2.2-2.8 (\bar{x} =2.6). Frons blackish brown pollinose with moderately abundant short black hairs and a slightly raised ocellar tubercle with 3 distinct ocelli. Eyes densely pilose, short haired; color not noted. Subcallus subshiny dark brown with sparse brown pollinosity. Genae yellowish brown pollinose. Frontoclypeus bulbous, upper half shiny dark brown, lower half subshiny yellowish brown. Antennae brown, third segment distinctly bipectinate. Palpi long and threadlike. Proboscis thin, reddish brown, about 5 times longer than height of frons. Beard yellowish brown.

Mesonotum and scutellum dark brown, covered with numerous short dark brown hairs. Pleura and coxae pale yellowish brown pollinose with concolorous hairs. Legs yellowish brown with mostly yellowish hairs.

Wings unpatterned, evenly smoky brown with a wrinkled texture. Fork of third vein with a short appendix, and fourth posterior cell open.

Abdomen above dark brown to blackish brown, vestiture of short black hairs except for a fringe of pale yellow hairs on last 2 segments. Abdomen below dirty yellowish brown with pale yellow hairs.

Male. Undescribed.

Distribution. Panama, Colombia (Choco, Valle), Ecuador.

Material examined. Panama, 9♀♀. Colombia: Cauca; Guapi, all from CO₂ baited flight traps, 5♀♀ 9 Feb. 1976, 4♀♀ 10 May 1976; Choco; La Teresita, 1♀ 20 June 1967, D. G. Young coll.

Discussion. *P. festae* is reported by Fairchild (unpublished 1978) to be a crepuscular flier, active in the early morning and in the evening until well after sunset. He also reports it attracted to but not readily biting man. It is similar to *P. cervus* which has pectinate instead of bipectinate antennae. *Cervus* occurs east of the Andes while *festae* is found west of the Andes and in Panama.

Genus *Chrysops* Meigen

Chrysops Meigen 1803, Illigers Mag. f. Insektenk., 11, p. 267.
Krober 1925, Konowia, 4(3-4):210-256, 319-375. Fairchild 1942, Proc.
Ent. Soc. Washington, 44(1):1-8, figs. 1-7. Philip 1955, Rev. Brazil
Ent. 3:47-128, keys. Mackerras 1955, Aust. J. Zool., 3(4):617-620,
full generic references.

The genus *Chrysops* may be distinguished from regional *Pangoniinae*
by the broad frons and wide protuberant callus, and from Colombian
Tabanini and *Diachlorini* by having hind tibial spurs. In addition,
species of *Chrysops* usually have bare face, lengthened first and
second antennal segments, variably sclerotized proboscis and labella,
eyes usually with purple bands and or spots, and wings with a strong
to faint crossband. Sixty-nine species are found in the Neotropics.

Of the 15 species reported from Colombia, 12 (including 1 new one)
were collected in the study area.

Key to *Chrysops* Species

1. Frontoclypeus with a median pollinose stripe. Wings with
broad black crossband, first basal cell about half black
basally, apical spot drop shaped. Second abdominal tergite
yellow with a thick black median inverted V-shaped mark,
and unconnected sublateral black spots (Fig. 28).
. *chiriquensis*
- 1'. Frontoclypeus entirely bare and shiny 2
- 2(1'). Discal cell largely hyaline. Abdomen largely yellow or
nearly wholly shiny blackish brown. 3
- 2'. Discal cell wholly infuscated 4

- 3(2). Mesonotum orange brown, the submedian pale stripes yellow pollinose, wider than the median brown stripe. Scutellum wholly yellow. Wings with yellowish brown crossband and apex, center of discal cell hyaline, hyaline triangle in fifth posterior cell, and round, diffuse hyaline spot in first submarginal cell. Abdomen yellow, with a pair of dorsolateral black stripes, solid on first or first two tergites, their centers largely yellow on posterior tergites (Fig. 29). *variegatus*
- 3'. Mesonotum blackish brown, without distinct stripes. Wings without a complete discal band, the cells hyaline, first and second submarginal cells and first and second posterior cells with small median dark spots. Abdomen shiny blackish brown (Figs. 7J-L, 33). *reticulatus* n. sp.
- 4(2'). Apical spot of wing a slender band or slightly widened, not extending beyond apex and encroaching into second submarginal cell (fourth R) only at extreme apex. 5
- 4'. Apical spot of wing extensive, filling most of wing apex and leaving but a narrow and irregular hyaline crescent or series of spots between it and crossband 8
- 5(4). Fifth posterior cell entirely infuscated or with at most a pale area at the apex. Fourth posterior cell usually with a small hyaline spot. Crossband broad and intensely black. Thorax black, without dorsal stripes or lateral spots. Abdomen black, sides of second tergite with small dull yellow triangles, and with small dull yellow median triangles on tergites 2-4 (Fig. 34). *leucospilus*

- 5'. Fifth posterior cell always with at least apex hyaline, often over half hyaline. Fourth with or without a hyaline spot 6
- 6(5'). Mesonotum and pleura blackish, without stripes or spots. Hyaline area in fifth posterior cell clearly extending into fourth cell, but not crossing it. Abdomen black with small dull yellow triangles laterally on second segment and median yellow triangles on tergites 2-5 (Fig. 27). *melaenus*
- 6'. Mesonotum striped, pleura striped or spotted. 7
- 7(6'). Second tergite black with yellow median hourglass-shaped mark extending longitudinal width of tergite, the sides broadly yellow. Third to fifth tergites black with yellow hind borders, widened into narrow median triangles which usually reach anterior borders of segments. Wings with broad dark crossband, without hyaline fenestra in first submarginal cell, and with hyaline area in posterior margin of crossband confined to fifth posterior cell. Apical spot black, extending as a clearly defined narrow costal stripe of even width to wing apex (Figs. 30). *varians* var. *tardus*
- 7'. Second tergite black, broadly yellow at sides, very rarely with a small median yellow spot, generally without any median mark. Tergites 3 and 4 black, with equilateral yellow triangles whose apices may reach anterior borders, tergite 5 with yellow hind border widened into a low triangle in middle. Wings with narrower crossband, the hyaline area in posterior margin of crossband large, filling all but base of fifth

- posterior cell and entirely crossing fourth posterior cell in middle. First submarginal cell with small hyaline streak at base (Fig. 31) *auroguttatus*
- 8(4'). Thorax black, mesonotum with two pale median gray pollinose stripes, pleura with pale gray pollinose areas. Abdomen with first tergite yellowish white with a narrow black posterior margin, second tergite yellowish white over a little more than anterior half, the black posterior portion narrowed laterally, remainder of abdomen shiny black, without marking . . . *renjifoi*
- 8'. Mesonotum without distinct stripes. Abdomen not as above . . . 9
- 9(8'). Hind femora at least one-third basally black. 10
- 9'. Hind femora red or yellow, at most extreme apex black . . . 11
- 10(9). Abdomen black with second segment anteriorly narrow and laterally broadly yellow, and with a broad yellow median triangle which rarely extends through the black to join the anterior yellow band. Tergites 3-5 or 6 with narrow yellow hind borders, widened into median triangles of variable size on 3 and often 4. Pleura usually with a spot of yellow pile, rarely lacking. Wings with crossband joined to cloud on fork of third vein by a dark bridge above the vein, leaving a small hyaline spot between cloud and crossband on vein (Fig. 25) *calogaster*
- 10'. Abdomen wholly black, or rarely with the pattern of *calogaster* faintly indicated in grayish pollinosity. Pleura always all black. Cloud on fork of third vein never joined by a complete bridge to crossband, rarely almost joined by spurs (Fig. 26) *soror*

- 11(9'). Cloud on fork of third vein joined to crossband by a broad spur of dark color. Mesotibiae black or blackish, contrasting with pale femora. Abdomen with second tergite narrowly white to yellow anteriorly, widened to full length of segment at sides and with a generally broad, small median yellow triangle. Third and fourth tergites rarely with faint vestiges of small pale median triangles (Fig. 24) *nezosus*
- 11'. Cloud on fork of third vein unconnected with crossband. Mesotibiae at most slightly brownish, not strongly contrasting with pale femora. Abdomen as above, but pale triangle on second tergite usually taller and narrower, occasionally joined to anterior yellow by a narrow median yellow stripe. Third tergite usually with a dull yellowish median streak, sometimes lacking, and fourth rarely with a minute paler streak (Fig. 32). *mexicanus*

Chrysops auroguttatus Krober
(Fig. 31)

Chrysops auroguttatus Krober 1930, Zool. Anz., 90(3-4):71-72, figs. 6-8, ♀, Colombia, Trinidad. Fairchild 1946, Ann. Ent. Soc. Amer., 39(4):565, Panama, Colombia. Philip 1955, Rev. Brasil Ent., 3:68, 80, 88, ♂, Panama.

Chrysops auroguttata var. *pallidefemorata*: Pechuman 1937, Rev. Ent., 7(2-3):136, Panama. Not Krober 1930.

Chrysops incisa: Fairchild 1942, Proc. Ent. Soc. Washington, 44(1):3-4, fig. 3, ♀, Panama. Not Macquart 1846.

A small blackish brown species with sides of mesonotum striped yellow, legs dark brown, wings dark brown with base of first

submarginal cell with a hyaline spot, and abdomen blackish brown with yellowish markings.

Female. Length 6-8mm (N=23, \bar{x} =6.6mm). Frontal index 1.1-1.3 (\bar{x} =1.2). Frons slightly divergent below, dull yellow pollinose, blackish brown on ocellar tubercle and at vertex. Vestiture of sparse pale yellow hairs. Three distinct reddish brown ocelli present on a raised tubercle. Callus pale brownish yellow, oval, wider than high, and swollen. Eye pattern as figured, metallic coppery red and purple. Area around antennal insertions, along the border of the eye, and narrow strips along sides of face yellow pollinose, the remainder of the genae and frontoclypeus shiny pale yellowish brown. Antennal segment 1 pale yellowish brown; segment 2 and base of third darker; last 4 annuli blackish brown. Relative average lengths of antennal segments, 1=30, 2=22, and 3=48 (N=23, 1SD=1 for all). Palpi swollen, pale brown with sparse brown hairs, about as long as frons is high. Proboscis brown, short, rather stout and wholly sclerotized except for fleshy edges of labella. Beard of short sparse pale yellow hairs.

Mesonotum blackish brown, notopleural lobes with yellow lateral stripes along entire length. Vestiture of numerous short pale yellow hairs above, golden yellow on the stripes. Scutellum blackish brown. Pleura dark brown with sparse pale pollinosity and pale yellow hairs except for patches of yellow pollinosity and golden yellow hairs on the mesanepisternum and the catapleurotergite. Legs dark brown except for dark yellowish brown profemora, most of mesofemora, and mesotibiae and tarsi. Wings hyaline with dark brown markings as figured, the small hyaline spot at base of first submarginal cell missing in some specimens.

Abdomen above with large lateral contiguous yellow markings on tergites 1 and 2 and small lateral yellow spots on the remainder. There are also middorsal irregular triangular yellow spots on tergites 3-6. Middorsal markings a fourth to a third as wide as segments and nearly reaching preceeding segments at apex. Sternites 1-4 pale yellow with a large median dark brown spot extending from the middle of sternite 2 through the middle of sternite 4; spot about half as wide as abdomen. Sternites 5-7 dark brown. Abdominal vestiture short and either brown or pale yellow corresponding to light and dark areas.

Male. Not taken by me from Colombia. The specimen labeled "Allotype" in coll G. B. Fairchild is from Mojinga swamp, Canal Zone. It is similar to the above description except that the legs are paler, the palpi are short and porrect, and the proboscis is thinner. The abdominal markings are obscured by grease.

Distribution. Mexico to Colombia (Choco, Valle, Cauca), Trinidad.

Material examined. Panama, 48♀♀, 1♂ (Allotype). Colombia: Cauca; Teresita, 2♀♀ 22 Aug. 1967, D. G. Young coll; between Puerto Utria and El Valle, 1♀ 27 July 1942, 2♀♀ 1 Sept. 1942; Valle; Rio Raposo, 1♀ 30 Jan. 1963, C. J. Marinkelle coll, 1♀ 4 Aug. 1964; Bajo Calima, from CO₂ baited flight traps, 8♀♀ 5 Sept. 1975; Cauca; Guapi, from CO₂ baited flight traps, 8♀♀ 9 Feb. 1976, 2♀♀ 10 May 1976.

Discussion. Fairchild (unpublished 1978) reports this species in Panama to "attack man persistently and enter horse-baited mosquito traps and light traps." Lee et al. (1969) collected 13 females and 1 male in the Rio Raposo area throughout the year but mostly in the drier months from Dec. to Feb. All females were taken attracted to man or attacking man and the male while sweeping swamp vegetation with an insect net.

Chrysops calogaster Schiner
(Fig. 25)

Chrysops calogaster Schiner 1968, Reise Novara, Zool. II, Abt. 1, Vol. B. Dipt., p. 103, ♀, South America. Fairchild 1942, Proc. Ent. Soc. Washington, 44(1):7, fig. 4, ♀, Panama, full references. Philip 1955, Rev. Brasil. Ent., 3:115-116. Goodwin and Murdoch 1972 Ann. Ent. Soc. Amer., 67(1):98 fig. 23.

A small blackish species with pale yellow abdominal markings, vaguely bicolored dark brown and pale yellowish brown legs, and wings with an extensive apical spot and narrow broken hyaline triangle.

Female. Length 4.5-6.4mm (N=19, \bar{x} =5.6). Frontal index 1.1-1.3 (\bar{x} =1.2). Frons pale yellow pollinose with short sparse pale yellow hairs. Three distinct ocelli present on a slightly raised tubercle. Tubercle and areas lateral to it shiny dark brown. Callus yellowish brown, upper margin dark brown; swollen, ovoid, and wider than high. Eye pattern not noted. Area around antennal insertions, along the border of the eye, and narrow bands along sides of face pale yellow pollinose. The remainder of the face shiny yellowish brown. Antennal segments 1 and 2 pale yellow with short black hairs; segment 3 pale yellowish brown basally, last 4 annuli brown. Relative average lengths of antennal segments, 1=27, 2=22, and 3=51 (N=19, 1SD=2, 1, and 5). Palpi 0.9 to 1.2 times as long as frons is high (\bar{x} =1.05); pale yellowish brown with short sparse pale brown hairs, slightly swollen basally, somewhat pointed apically. Proboscis short, wholly sclerotized except for fleshy edges of the labella. Beard of short, sparse pale yellow hairs.

Mesonotum unstriped blackish brown with numerous short pale yellow hairs, scutellum concolorous. Pleura dark brown, the pollinosity

sparse and grayish except for bright yellow pollinose patches on the mesoanepisternum, the catapleurotergite, and the mesocatepimeron. Vestiture of sparse pale yellow and yellow hairs. Legs brown or dark brown with vaguely contrasting pale yellowish brown profemora, apical half of mesofemora, apical fourth of metafemora, and metatarsi. Leg hairs brown or pale brown. Wings patterned dark brown as figured.

Abdomen blackish brown with pale yellow markings as follows. Lateral spots on tergite 1 continuous with a large spot on sternites 1 and 2. Tergite 2 with an anterior band narrow in the middle, expanded to entire segmental width laterally and a median posterior equilateral triangle slightly higher than half segmental height. Tergites 3-5 with thin irregular posterior marginal bands expanded medially and not reaching lateral margins. Vestiture of dark brown and yellow hairs corresponding to light and dark areas.

Male. Not seen by me from Colombia.

Distribution. Costa Rica to Colombia (Choco, Cundinamarca, Boyaca, Meta, Amazonas), Peru, and Brasil (Amapa).

Material examined. With yellow pleural spots. Panama, 18^{♀♀} (including one compared to type of *C. calogaster* by C. B. Philip). Colombia: Boyaca; Muzo, alt. 900m, 2^{♀♀} 1936, J. Bequaert coll (one compared to type *C. calogaster* by G. B. Fairchild, 1964, with good agreement). Without yellow spots on pleura. Panama, 3^{♀♀}. Brazil (Amapa) 2^{♀♀}. Colombia: Choco; Teresita, D. G. Young coll, 1[♀] 22 March 1967, 1[♀] 29 March 1967, 1[♀] 7 May 1967; Amazonas; 17km W Leticia, flight trap, 1[♀] 25 July 1973, Wilkerson and Young coll.

Discussion. There are at least three forms represented here; the above description is primarily of the specimen compared to the type

of *C. calogaster* by G. B. Fairchild. This form has yellow pollinose spots on the pleura. The triangle of the second tergite is variable in size, some smaller, others larger, joining the anterior band of that segment.

The other specimens lack the yellow pleural spots and instead have pale gray spots. In addition they are darker overall and the abdominal markings much less extensive. A possible third form is represented by the specimen from Amazonas and the 2 from Brasil. They have pale pleural spots but lack a dark streak above the vein joining the crossband to the spot on furcation of third vein, present in the other 2 forms. Due to lack of sufficient material I treat them as *C. calogaster*.

Bequaert and Renjifo (1946) report specimens from Choco; El Valle, Utria, Cundinamarca; Villeta, and Meta; Restrepo.

Goodwin and Murdoch (1974) reared a male from a single larva found among decaying leaves in a small sluggish stream.

Chrysops chiriquensis Fairchild
(Fig. 28)

Chrysops chiriquensis Fairchild 1939, Proc. Ent. Soc. Washington, 41(2):259-260, figs. 2-3, ♀, Panama, Guatemala, 1942, Proc. Ent. Soc. Washington, 44(1):5. Bequaert and Renjifo 1946, Psyche, 53(3-4): 58-59, ♂, Colombia. Philip 1955, Rev. Brasil. Ent., 3:52, 74, ♂, ♀, in key only.

Chrysops subcaecutiens: Hine 1925, Occ. Papers Mus. Zool. Univ. Michigan, No. 162, p. 20, Boquete, Chiriqui. (In part, not Bellardi).

A small to medium, hairy, blackish brown species with a median pollinose facial stripe, legs dark brown, wing markings dark

brown, the apical spot almost separated from crossband, and abdomen with pale yellow markings.

Female. Not seen by me from Colombia. Length 6.5-9.0mm. Frontal index 0.9-1.1 ($n=7$, $\bar{x}=1.0$). Relative average lengths of antennal segments, 1=32, 2=24, and 3=44.

Fairchild in the original description states the following:

Length--8mm, of wing, 8mm. Frons slightly wider than high, yellowish grey pollinose. The black or slightly yellowish callus nearly twice as wide as high, and almost as wide as the frons. The ocelli are black, and situated upon a large bare ocellar tubercle which is beset with long hairs. Frontoclypeus shining brown, darker laterally, and with a narrow vertical median pollinose stripe. Antennae slightly longer than fore femora; the segments, beginning with the first, have length ratios of 1.37, 1, and 2.25. The first segment is dirty yellowish brown and slightly swollen, the second is darker and practically cylindrical, and the 3d is yellow only at the extreme base, the rest black. Only the terminal 4 or 5 annulations are clearly visible. The two basal segments of the antennae are rather thickly beset with black hairs.

Thorax black above, with a pair of very short yellowish dorsolateral lines on the anterior end, and clothed with sparse long greyish hairs. Pleura brownish with dark hairs. Legs dull reddish to yellowish brown throughout, except apices of femora and tarsi, which are blackish. All legs clothed with black hair, which on the hind tibiae forms rather prominent fringes.

Wing hyaline except as follows. Costal cell, basal half of first basal and basal 3d of second basal cells black. Crossband broad, filling out half of 3d and all of 4th and 5th posterior cells, the apex of anal cell, and fading out proximally in the axillary cell. The outer border of the cross-band is fairly even, but there is a slight projection in the first submarginal cell. The hyaline crescent reaches the costa, the apical spot thus being separated from the cross-band. The apical spot is drop-shaped, and extends just to the apex of the wing.

The first segment of the abdomen is black, or with considerable yellow on the sides; the second is yellow, with a thick, black mid-dorsal inverted V, which reaches the anterior but not the posterior margin, and there is a small black diagonal mark extending from

the hind margin on each side towards the center. The 3d to 5th segments are black, with a yellow W-shaped mark in the middle of each, and the 6th and 7th segments are black, with a narrow yellow hind margin. Beneath, the abdomen is blackish, with a pair of yellowish parallel lines, and is clothed with gray hairs.

(1939, pp. 259-260)

Male. Not collected by me from Colombia nor have I examined any specimens. Bequaert and Renjifo (1946) report the male of *chiriquensis* from Magdalena, Santa Marta region collected by W. M. Mann (U.S.N.M.). They believed it to be the male because, "It agrees with the female in many characters, particularly in the shape of the antennae and the presence of a median pollinose stripe on the frontoclypeus (over the basal or upper half). The wing markings are similar also, but the basal cells are much more extensively black. The abdominal pattern is the same, but the yellow markings are slightly smaller. Length, 7mm, of wing 7.5mm. The frontoclypeus is much swollen and divided by a deep median saddle." Philip (1955) includes it in a key with the following characters, "A central American species with eyes barely contiguous, scapes only a little swollen, face yellow with brown spots on the lateral sutures, the median pollinose stripe only a shortened spur above; tergites 2 to 4 with double geminate figures; apical spots separated from the broad crossband; latter reaches the hind margin of the wing without enclosing a sharply outlined, hyaline spot in cell Cu_1 ."

Distribution. Mexico (Chiapas), Guatamala, Panama, Colombia (Magdalena).

Material examined. Mexico, 2 $\frac{00}{++}$. Guatamala, 4 $\frac{00}{++}$. Panama, 1 $\frac{0}{+}$.

Discussion. I have not seen Colombian material. In Panama Fairchild (unpublished 1978) reports this as a rare mountain species with records of specimens from over 3000 feet.

The abdominal markings vary in the material examined, the first segment being mostly pale in some Guatemalan and Mexican specimens and completely black in those from Panama.

Chrysops leucospilus Wiedemann
(Fig. 34)

Chrysops leucospilus Wiedemann 1828, Auss. zweifl. Ins. 1:202, ♀, Brasil. Lutz 1909, Zool. Jahrb. 4(Suppl. 10):676, pl. 3, fig. 47. Krober 1926, Konowia (1926):334, pls. 3, 5. Philip 1955, Rev. Brasil. Ent., 3:115. Fairchild 1971, Cat. S. Amer. Dipt. Fasc. 28, pl. 32, synonymy.

A small to medium blackish species with small yellow median triangles on all tergites, small lateral yellow patches on abdominal tergite 3, a narrow apical spot, and a very small hyaline spot in fourth posterior cell in the black crossband. Legs largely blackish.

Female. Length 5.5-8.0mm (N=15, \bar{x} =6.9). Frontal index 1.1-1.4 (\bar{x} =1.2). Frons slightly divergent below, pale yellowish brown pollinose. Three distinct ocelli present on a raised tubercle, the tubercle and surrounding area blackish. Callus pale yellowish brown, swollen, ovoid, wider than high. Frons with sparse dark brown hairs. Eye color or pattern not noted. Area around antennal insertions, in a thin strip bordering eye, and in lateral strips below tentorial pits pale brownish yellow pollinose. The remainder of the genae and fronto-clypeus shiny yellowish brown. Antennae yellowish brown, the last 4 annuli dark brown, vestiture of short brown hairs. Antennal segment 1 swollen, about twice as wide as second and third segments. Relative average lengths of antennal segments, 1=30, 2=21, and 3=49

1SD=1, 1, and 2). Palpi yellowish brown, swollen, slightly longer than frons is high, with sparse short pale brown hairs. Proboscis stout, sclerotized except for most of labella. Beard sparse, brown.

Mesonotum and scutellum blackish brown, with unstriped, short pale yellow hairs. Mesonotal pollinosity dark reddish brown laterally. Pleura and coxae blackish brown in ground color with sparse dark reddish brown pollinosity and sparse brown hairs. Legs brown with dark brown hairs except basal three-fourths of metafemora and all of metatibiae which are blackish brown. Wings blackish as figured.

Abdomen blackish brown with the following pale yellow markings: Diffuse faint spots laterally on tergite 1; large lateral spots on tergite 2, each one-third width of segment; sternite 2 with diffuse sublateral spots; tergites 2-4 with small median triangular spots. Abdominal vestiture of short brown and pale yellow hairs on corresponding light and dark areas.

Male. Not known.

Distribution. Panama, Colombia (Antioquia, Vaupes, Meta, Boyaca) to Paraguay.

Material examined. Brazil, 12^{♂♂} including 1 compared to type of *C. leucospilus* Wied. by G. B. Fairchild, 1963, Annapolis Goiaz 16 Nov. 1936. Panama, 1[♀]. Paraguay, 1[♀]. Colombia: Vaupes; 1[♀] April 1942, Gast. coll.; Meta; Restrepo, 1[♀] 1935, P. C. A. Antunes coll.; Villavicencio; Bosque Ocoa, 1[♀] 31 March 1942; Villavicencio, 2^{♀♀} April 1940, 1[♀] 22 Aug. 1947; Boyaca; Muzo, 900m, 1[♀] 1936, J. Bequaert coll.

Discussion. The above description is of the homotype from Brazil. Most specimens from Colombia differ by having a smaller hyaline spot

in the fourth posterior cell; the Panama specimen lacks this spot completely. In addition the lateral spots on tergite 2 of the Panama specimen are smaller. Bequaert and Renjifo (1946) report *C. leucospila* from Boyaca, Muzo; Meta, El Caibe and Villavicencio; and Vaupes, between San Jose del Guaviare and Calamar.

C. Porter(pers. comm. 1976) captured this species in the Providencia region of Antioquia.

Chrysops melaenus Hine
(Fig. 27)

Chrysops melaena Hine 1925, Occ. Pap. Mus. Zool. Univ. Michigan, No. 162, p. 17, ♀, Panama, Costa Rica, Venezuela. Fairchild 1942, Proc. Ent. Soc. Washington, 44(1):3, fig. 2, ♀, Panama, full references. Fairchild 1953, Ann. Ent. Soc. Amer. 46(2):259-260, ♂, Panama. Philip 1955, Rev. Brasil. Ent., 3:68, 80, in key only. Goodwin and Murdoch 1974, Ann. Ent. Soc. Amer., 67(1):100, fig. 24.

A small blackish brown species similar to *leucospilus*, but smaller and with hyaline spot in fourth posterior cell extending halfway into fifth posterior cell.

Female. Length 5.0-7.5mm (N=17, \bar{x} =6.5mm). Frontal index 1.0-1.2 (\bar{x} =1.1). Frons divergent below, pale yellow pollinose. Three distinct ocelli present on a raised tubercle at vertex. Tubercle and surrounding area mostly shiny blackish brown, frontal callus large, more than half as high as frons, pale brownish yellow, swollen, ovoid, and wider than high. Frontal vestiture sparse, mostly pale yellow hairs. Eye color or pattern not noted. Area around antennal insertions, along border of eye and a strip on side of face pale yellow

pollinose, the remainder of genae and frontoclypeus shiny brownish yellow. Antennal segment 1 brownish yellow, segments 2 and 3 pale brown, the last four annuli dusky. Antennal hairs dark brown. Relative average lengths of antennal segments, 1=32, 2=22, and 3=46 (1SD=2, 1, and 4). Palpi yellowish brown with short pale yellow and brown hairs, somewhat inflated, bluntly pointed, and 1.1 times longer than frons height. Proboscis wholly sclerotized except for labella, about one and one half times longer than palpi. Beard of sparse brown hairs.

Mesonotum and scutellum blackish brown, unstriped, with numerous short pale yellow and some dark brown hairs. Pleura and coxae blackish brown with sparse dark brown pollinosity and sparse dark brown hairs. Legs dark brown except for profemora, apical halves of mesofemora, all of mesotibiae and mesotarsi, and metatarsi which are dark yellowish brown. Wings dark brown as figured.

Abdomen blackish brown marked with pale yellow as follows: Tergite 1 with indistinct lateral spots; tergite 2 with large sub-lateral spots; and tergites 2-5 with small middorsal triangular spots. Vestiture of numerous short dark brown and pale yellow hairs corresponding to dark and light areas. Segments 6 and 7 with a few long pale apical hairs.

Male. Not collected nor seen by me from Colombia. Fairchild describes a male from Panama as follows.

Eyes bare, holoptic but the line of contact short, the frontal triangle elongate. Eyes not greatly enlarged, the area of large facets about half the total eye area, clearly demarcated from the small facets. Antennae about as in female, though the second and third joints a little more slender and darker. Palpi black.

(I find the palpi in this specimen to be yellowish brown as in the female.)

Thorax and legs as in female, the former wholly black with sparser vestiture. Wings as in female, except that the basal cells are almost wholly black, with only a small clear spot at apex, and the anal cell is black with a small clear area in the middle. The abdomen is as in the female, except that the lateral yellow patches and the median yellow triangle on the second tergite are much reduced in size and the triangles on succeeding tergites smaller than in female.

(1953, pp. 259-260)

Distribution. ?Nicaragua, Costa Rica to Venezuela. Colombia (Choco, Valle, Santander).

Material examined. Costa Rica, 15^{♂♂}, 1♂. Panama, 67^{♂♂}, 1♂ (described above). Venezuela, 2^{♂♂}. Colombia: Choco; La Teresita, 1[♀] 24 May 1967, D. G. Young coll; Valle; Bajo Calima, 10km E Buenaventura, flight trap baited with CO₂, 1[♀] 5 Sept. 1975.

Discussion. Fairchild (unpublished 1978) reports *C. melaenus* as attacking man readily and to be attracted to horse-baited stable traps. Goodwin and Murdoch (1974) reared 13 specimens "from smooth, moist soil in a partially shaded area."

In addition Bequaert and Renjifo (1946) report a specimen from Santander Sur, Jazmin.

Chrysops mexicanus Krober
(Fig. 32)

Chrysops calogaster var. *mexicana* Krober 1925, Konowia, 4:248, pl. II, IV, ♂, ♀, Mexico.

Chrysops mexicana: Fairchild 1942, Proc. Ent. Soc. Washington, 44(1):8, fig. 6, Panama, in part; 1946 Ann. Ent. Soc. Amer., 39(4): 565-566. Philip 1955, Rev. Brasil. Ent., 3:109-110, types seen.

A small blackish species with an unstriped thorax, bicolored yellowish brown and brown legs, wings with a hyaline patch in fifth posterior cell, spot at furcation not connected to crossband, and tergites 2, 3, and 4 with small middorsal pale spots.

Female. Length 5.0-6.5mm (N=20, \bar{x} =6.0). Frontal index 1.1-1.4 (\bar{x} =1.3). Frons pale yellow pollinose with pale yellow hairs, slightly divergent below. Raised ocellar tubercle and area around it shiny blackish brown. Frontal callus raised, oval, yellowish brown and wider than high. Eye color and pattern not noted. Area around antennal bases, along border of eye and a stripe on side of face below tentorial pit yellow pollinose, the remainder shiny yellowish brown. Antennal segment 1 pale yellowish brown, segment 2 dark brown, segment 3 pale yellowish brown basally, last 4 annuli blackish brown. Antennal hairs brown and pale yellowish brown. Relative average lengths of antennal segments, 1=27, 2=22, and 3=51 (1SD=2, 2, and 3). Palpi yellowish brown with pale brown and brown hairs, somewhat inflated, bluntly pointed and slightly longer than height of frons. Proboscis rather stout and sclerotized except for outer parts of the labella. Beard sparse and pale yellow.

Mesonotum and scutellum blackish brown, unstriped with numerous short pale yellow hairs. Pleura and coxae dark reddish brown with sparse pale yellow pollinosity except for dense yellow pollinose spots just behind head, on mesoanepisternum, and just below wing base; vestiture of sparse pale yellow hairs. Femora pale yellowish brown, tibiae brown to dark brown, protarsi brown, and meso- and metatarsi yellowish brown. Wings dark brown as figured. Cloud on fork of third vein not connected with crossband.

Abdomen above blackish brown with the following pale yellow markings: Tergite 2 with large lateral spots which meet anteriorly to form a continuous transverse mesially narrowed band, and a median triangular spot which in some specimens reaches this anterior band; tergites 3 and 4 with faint median triangular markings. Sternites 1 and 2 mostly pale to completely dark in some specimens. Sternites 3, 4, and 5 sometimes with faint pale yellow sublateral stripes. Vestiture of pale yellow and brown hairs corresponding to light and dark areas.

Distribution. Mexico to Colombia (Antioquia, Valle).

Material examined. Mexico, 2♂♂ (including 1 compared to type of *C. mexicanus* by C. B. Philip) . Costa Rica, 1♀. Panama, 34♀♀. Colombia: Valle; Rio Raposo, 13m in a tree platform, V. H. Lee leg. 1♀ 26 Nov. 1963.

Discussion. *C. mexicanus* is similar to *C. nexosus* differing primarily by having the cloud on fork of third vein not joined to crossband by a dark band, but also by those characters listed in the key.

Fairchild (unpublished 1978) reports this species from Panama from forested areas of high rainfall between 1000 and 3000 ft.

Lee et al. (1969) captured 10 females and 1 male in the Rio Raposo area, the females from human bait, 2 at heights of 13 and 18m in the forest canopy. All were caught from May to November. Fairchild (1953) also reports a small percentage from canopy collections.

Porter (pers. comm. 1976) reports *mexicanus* from the Providencia region of Antioquia.

Chrysops nexosus Fairchild
(Fig. 24)

Chrysops nexosus Fairchild (unpublished 1978).

Chrysops mexicanus: Fairchild 1942, Proc. Ent. Soc. Washington, 44(1):8, fig. 7, in part; 1946, Ann. Ent. Soc. Amer., 39(4):565-566, in part. Not Krober 1925.

The following is the original description of Fairchild:

Female. Length of wing 6mm. Frons dark grey pollinose, slightly higher than wide. Callus dull yellowish, bordered with blackish above, as wide as frons and slightly less than twice as wide as high. Frontoclypeus inflated, wholly shiny yellow to antennal insertions above and nearly to eye margin laterally, without marked lateral protuberances above tentorial pits; latter blackish within. Genae shiny yellowish, separated from shiny frontoclypeus by a strip of thin golden pollinosity extending from eye margin to base of proboscis just below tentorial pits. Behind the eyes, the genal area becomes dark brown, shiny a third of distance to occiput and sparsely yellow haired. First antennal segment yellowish brown, cylindrical, slightly longer than second. Second cylindrical, obscurely ringed, blackish. Third of a yellowish basal plate of four fused annuli, and a blackish style of four distinct segments, the style slightly longer than basal plate, the whole third segment about equal to sum of first two. Palpi slender, dull yellow, subshiny, a little longer than first antennal segment but slightly shorter than proboscis. Proboscis brown, subshiny, the labella partly sclerotized.

Mesonotum blackish, subshiny, with vestiges of two broad greyish-green pollinose stripes anteriorly, sparsely beset with pale yellowish hairs. Scutellum concolorous. Pleura mainly dark brown, thinly grey pollinose and dark haired, but with upper half of mesopleura and infra-alar callosity golden yellow pollinose and with long yellow hairs. Coxae and trochanters black, fore and mid femora clear yellow, the hind pair yellow with apical fourth or less blackish. Fore and mid tibiae brown, slightly paler basally, hind tibiae darker, nearly black, all slightly inflated. Legs largely dark haired but with some pale hairs mesially and on opposing surfaces. Tarsi yellowish brown, darker apically. Wing as figured (Fairchild 1942, fig. 7). Halteres blackish brown. Abdomen with first tergite black, with a small dull yellowish spot on extreme postero-lateral corner, not generally visible from dorsal side. Second tergite black with a yellowish horn-colored transverse band on

fore border, narrow in the middle, but widening to nearly full length of tergite on extreme sides, and with a yellow pollinose middorsal triangle, higher than wide and about half length of tergite, on hind margin. Third tergite black with an obscure pale median mark, higher than wide, but hardly half as tall as the triangle on tergite two and not as well defined. Remaining tergites black. Hairs are sparse, black, yellow only on pale areas of second tergite. Beneath the first segment is yellowish horn colored, the second largely so, but with a mid-ventral posterior black triangle with base on posterior margin, and with posterior lateral corners and extreme sides infuscated. Remainder of sternites blackish.

Holotype female, Santa Fe, Veraguas Province, Panama, 9 Aug. 1950, taken at platform in forest canopy 26 feet above ground level. (Unpublished 1978)

Male. Not known.

Distribution. Panama, Colombia (Valle).

Material examined. Panama, 20^{♀♀} (including the holotype).

Colombia: Valle; Rio Zabaletas, flight trap, 1[♂] 5 July 1975.

Discussion. Fairchild notes the following concerning the Panamanian paratypes:

There is some variation in the paratypes, many lacking any trace of spot on third tergite, some having the yellow on second tergite less extensive and many having a hyaline spot in second submarginal cell (4thR) distal to fork. The largest specimen, from La Victoria, has a wing length of 7mm, the smallest, from Rio Mandinga, a length of 5mm. One of the paratypes from Cerro Sta. Rita was compared with Krober's types of *mexicanus* by Dr. Philip in 1953, his notes indicating it differed in narrower hyaline crescent, the dark spur from crossband to fork broader than in types, and that the types lacked yellow triangles on tergites 3 and 4. This last comment is a little ambiguous, as this specimen also lacks all but a trace of pale on tergite 3, none on 4. (Unpublished, 1978)

My measurements show these paratypes to be from 4.5-6.5mm (N=20, \bar{x} =5.3mm) and have frontal indices of from 1.1-1.3 (\bar{x} =1.2). The relative antennal segment lengths are 1=27, 2=22, and 3=51. The palpi average 1.1 times longer than frons height.

The specimen collected by me from Colombia differs from the holotype by being darker overall (blackish brown rather than dark brown) and by having the third antennal segment longer (62 vs. $\bar{x}=51$ for all the Panamanian specimens) in relation to the total antennal length.

Chrysops renjifo Bequaert

Chrysops renjifo Bequaert 1946, Psyche, 53(1-2):6-12.

Not seen by me. The original description of Bequaert is included here.

Female. Small, related to *C. latitibialis* Krober and the species described below as *C. weberi*.

Frons very slightly higher than wide (appearing as wide as high in exact front view), mostly grey pollinose; ocellar area very little raised, denuded, shiny black, not extended downward; frontal callus low, black, transverse, with nearly straight sides which are separated from the eyes by narrow pollinose orbits. Frontoclypeus shiny honey-yellow, with infuscated blotches; upper half of cheeks, very narrow inner orbits and entire outer orbits grey pollinose; facial pits yellow; upper lateral areas (above the pits) flattened convex, not conical. Antennae dirty-yellowish on segment 1, fuscous-brown to blackish on 2 and 3, very slender, much longer than fore femora; segment 1 about one and one-third times the length of 2; 3 scarcely longer than 1, its basal portion very little swollen; 1 and 2 cylindrical, not swollen, equally thick both from above and in profile. Palpi yellowish-brown. Thorax black, fairly shiny, lightly covered with grey pollinosity, which forms two narrow, continuous median lines on the dorsum and is more pronounced on the pleura and on the sides of the dorsum between the wings and the shoulders; no pleural stripes nor spots; scutellum shiny black. Legs mostly infuscated to black; much of fore femora, extreme tips of mid and hind femora, and entire hind tarsi dirty yellowish-white; all tibiae flattened convex, moderately widened. Wings fairly cloudy over most of the clearer areas, decidedly hyaline only in the two basal and the anal cells; darker markings as follows: costal and subcostal cells, very narrowly connected with the apical spot, which is poorly defined but fills in most of the apex of the wing; it is darkest close to the costa and fades gradually toward the 3rd posterior cell; a very narrow, nearly hyaline streak divides it from the distal

margin of the crossband, beginning well inside the marginal cell a short distance from the costa; cross-band with nearly straight distal edge, far from the fork on the third vein, divided at the hind margin by an ill-defined, semi-hyaline spot covering much of the 5th and the median portion of the 4th posterior cells; center of discal cell also somewhat paler: base of wing, extreme tips and bases of both basal cells and narrow upper margin of anal cell infuscated; stigma well defined, blackish-brown; anal cell broadly open at apex. Halteres black. Abdomen: 1st tergite yellowish-white, with a narrow black apical margin; 2nd tergite yellowish-white over a little more than anterior half, the black hind portion extending inward along the sides; 1st and 2nd sternites mostly pale yellowish; remainder of abdomen shiny black, without marking, yellow of 1st and 2nd tergites slightly grey pollinose, the 1st on each side with a prominent yellowish pollinose spot; all tergites with a few, scattered, short white hairs.

Length (not including antennae), 5mm; of wing, 5.8mm.
(1946, pp. 6-12)

Male. Not known.

Distribution. Colombia (Valle).

Material examined. Not seen by me.

Discussion. Reported from the holotype and a single paratype from Colombia, Valle, Rio Yurumangui, 25 March 1943, Santiago Renjifo-Salcedo coll.

The type locality is on the Pacific coast approximately 60km S of Buenaventura in an area of high rainfall.

Chrysops reticulatus n. sp.
(Figs. 7J-L, 33)

Chrysops soror: Lee et al. 1969, *Caldesia*, 10(49):445.

A small blackish brown species without contrasting body markings and with bicolored dark brown and yellowish brown legs. Wings with a peculiar broken pattern which leaves the centers of most cells in cross-band clear and the apical spot a series of spots and streaks between the veins.

Female. Length 6mm, of wing 7mm. Frontal index 1.3. Frons, antennae, and palpi as figured. Frons pale yellow pollinose. Ocellar tubercle bearing 3 dark reddish brown ocelli with sparse pale pollinosity; areas lateral to tubercle shiny dark reddish brown. Callus yellowish brown with the upper border dark brown. Area around antennal insertions and a narrow strip below tentorial pit pale yellow pollinose. Remainder of genae and frontoclypeus shiny pale yellowish brown. Antennal segment 1 yellowish brown with segment 2 slightly darker and segment 3 brown with the last 4 annuli dark brown. Relative lengths of antennal segments, 1=30, 2=22, and 3=48. Antennal hairs brown and yellowish brown on segment 1, dark brown on segment 2. Palpi yellowish brown, brown haired, about as long as frons is high. Proboscis moderately stout, light brown with dark brown hairs, wholly sclerotized except for the fleshy labella. Beard of sparse pale brown and pale yellow hairs.

Mesonotum and scutellum blackish brown in ground color with slightly paler pollinosity. Mesonotum without markings except for 2 faint anterior, sublateral, grayish yellow pollinose stripes. Vestiture mostly of moderately numerous short pale hairs but with a few dark brown hairs interspersed. Pleura and coxae blackish brown with sparse grayish yellow pollinosity and sparse pale yellow hairs. Profemora, tibiae, and tarsi yellowish brown, the tibiae slightly darker. Basal three-fourths of meso- and metafemora dark brown, the remainder yellowish brown. Mesotibiae, mesotarsi, and metatarsi yellowish brown, metatibiae dark brown. Leg hairs dark brown. Halteres with stem brown, base of knob dark brown, knob dark reddish brown. Wing dark brown as figured.

Abdomen blackish brown with dark brown pollinosity except for faint grayish brown pollinose patches laterally and a small middorsal patch on tergite 2. Vestiture of numerous short dark brown hairs with pale yellow hairs on the paler patches.

Male. Not known.

Distribution. Panama (San Blas), Colombia (Valle).

Material examined. Panama: Holotype, ♀, San Blas, Rio Mandinga, 13 May 1957, P. Galindo coll. Colombia: Paratypes, Valle, Rio Raposo, human bait, 2♀♀, 22 May 1965, V. Lee coll.

Discussion. The paratypes are 5.5 and 7.0mm in length and have frontal indices of 1.4 and 1.3. They differ only slightly from the holotype by having wholly dark meso- and metafemora, and lacking any abdominal pale markings. One of the paratypes has slightly less extensive wing markings.

C. reticulatus appears identical to *C. soror* Krober except for the wing markings (Figs. 26, 33). *C. reticulatus* is reminiscent of *C. guttipennis* Krober which is distinguished from *C. variegatus* (DeGeer) in a similar way.

Lee et al. (1969) report this species as *C. soror* from the Rio Raposo area. In addition to the paratypes they collected 1♀ on 21 June and 1♀ on 20 July 1965. All came to human bait at ground level.

Chrysops soror Krober
(Fig. 26)

Chrysops soror Krober 1925, Konowia, 4:245, pl. 2, ♀, Venezuela. Fairchild 1942, Proc. Ent. Soc. Washington, 44(1):7-8, fig. 5, Panama, Guatemala, full references. Philip 1955, Rev. Brasil. Ent., 3:59, in key.

A small blackish brown species without contrasting body markings, with bicolored dark brown and yellowish brown legs, wings with extensive apical spot, and furcation not joined to crossband.

Female. Except for the distinctly different wing pattern (Figs. 26, 33) is quite similar to *C. reticulatus*. Length 4.5-7.0mm (N=20, \bar{x} =5.5mm). Frontal index 1.1-1.3 (\bar{x} =1.2). Relative average lengths of antennal segments, 1=27, 2=22, and 3=51 (1SD=2, 1, and 2). Palpi average 1.1 times longer than average frons height.

Male. Undescribed, not seen by me.

Distribution. Guatamala, British Honduras, Honduras, Panama, Colombia (Antioquia, Boyaca), Venezuela.

Material examined. Panama, 19⁰⁰₇₇. British Honduras, 1[♀]. Honduras, 2⁰⁰₇₇

Discussion. Not collected by me in Colombia. Porter (pers. comm. 1976) took this species in the Providencia region of Antioquia, in addition Bequaert and Renjifo (1946) report it from Boyaca, Muzo.

Fairchild (unpublished 1978) reports that in Panama it is mostly captured in the mountains over 2000 ft.

Chrysops varians var. *tardus* Wiedemann
(Fig. 30)

Chrysops tardus Wiedemann 1828, Auss. zweifl. Ins. 1:577.

Chrysops varians var. *tardus*: Fairchild 1971, Cat. S. Amer. Dipt., Fasc. 28 p. 34, synonymy.

A small dark brown species with distinctive yellow thoracic stripes and pleural spots, dark brown legs, wing pattern well defined

dark brown with a hyaline spot in fifth posterior cell, and abdomen distinctly pale yellow marked including an hourglass mark on tergite 2.

Female. Length 5.5-7.0mm (N=20, \bar{x} =6.3mm). Frontal index 0.95-1.2 (\bar{x} =1.1). Frons pale yellow pollinose with sparse pale yellow hairs, ocellar tubercle raised, bears 3 reddish brown ocelli. Tubercle and areas lateral to it shiny, deep blackish brown. Callus ovoid, wider than high, and deep blackish brown except for a paler lower border. Eye pattern purple on metallic green. Area around antennal insertions, along entire border of eye, and a stripe laterally below tentorial pit yellow pollinose, the remainder of the genae above the lateral stripe and frontoclypeus shiny yellow brown; below the lateral stripe shiny blackish brown. Antennal segment 1 yellowish brown, segment 2 darker, segment 3 blackish brown. Antennal hairs dark brown. Relative antennal segment lengths, 1=32, 2=25, 3=43 (1SD=2, 2, and 3). Palpi dark yellowish brown with sparse dark brown hairs; somewhat inflated basally and bluntly pointed, slightly larger than height of frons. Proboscis dark brown, half again as long as palpi, wholly sclerotized except for labella. Beard of sparse pale yellow hairs.

Mesonotum dark brown, marked with 4 distinct whitish yellow to yellow stripes; 1 on either side of the midline and 1 on each side laterally above wing bases. Vestiture of brown and pale yellow hairs corresponding to light and dark areas. Scutellum blackish brown, brown and pale gray pollinose with sparse long pale yellow hairs. Pleura and coxae blackish brown, mostly dark brown pollinose with 7 distinct yellow pollinose spots, 4 below the wing, 1 posterior to haltere, and 2 above procoxae. Femora dark brown basally, dark yellowish brown

apically; tibiae dark brown; tarsi yellowish brown. Wings hyaline with a dark brown to black pattern as figured.

Abdomen dark brown to blackish, variably marked with yellow or pale yellow as follows: Small lateral spots and a small median spot posteriorly on tergite 1; tergite 2 with large lateral spots which meet anteriorly and are continuous with a large median hourglass mark leaving this tergite with 2 dorsolateral dark triangles; tergites 3-6 all with pale posterior margins and median triangles of variable size, that of segment 3 sometimes reaching preceding segment. Below sternites 1 and 2 pale but sometimes with a median dark patch. The remaining tergites dark brown with pale borders, sternite 3 often with sublateral pale patches. Abdominal vestiture of numerous brown and pale hairs corresponding to light and dark areas.

Male. Male differs markedly in darker overall color, middorsal pale mark of tergite 2 does not reach its anterior margin and the wing pattern is more extensive basally.

Distribution. E. Panama to S. Brazil, Ecuador, Peru, Trinidad. Colombia (Choco, Antioquia, Caqueta, Valle, Cauca, Meta, Santander, Amazonas, Putumayo).

Material examined. Panama, 7♀♀. Venezuela, 1♀, 1♂. Ecuador, 3♀♀, 1♂. Peru, 5♀♀. Uruguay, 1♀. Brazil, 101♀♀, 2♂♂ (including 1 compared to type of *C. varians* by G. B. Fairchild 1964). Colombia: Valle; Bajo Calima, flight trap baited with CO₂, 7♀♀, 1♂ 5 Sept. 1975; Cauca; Guapi, CO₂ baited flight trap, 1♀ 25 July 1975, 100♀♀, 23♂♂ 9 Feb. 1976, 8♀♀ 10 May 1976; Putumayo; locality unknown, 1♀ 20 Aug. 1972; Mocoa, CO₂ baited flight trap, 27♀♀ 15 May 1976, 2♀♀ 1♂ 15 May 1976.

Discussion. Bequaert and Renjifo (1946) list the following localities (p. 57 as *C. laeta*). Amazonas; El Encanto. Antioquia; near Medellin; Porcecito, Rio Porce. Caqueta; Florencia. Choco; Andagoya; Utria. Meta; El Caibe; Restrepo; Villavicencio. Putumayo; Puerto Limon. Valle; Sonso; Hacienda El Tablazo, Tulua.

Lee et al. (1969) captured 30 females and 3 males in the Rio Raposo area and 1 female from Rio Micay. The males were captured by sweeping swamp vegetation. All the females were taken at human bait, 1 at 13m in the canopy, the rest at ground level. Most were caught in July and August.

Porter (pers. comm. 1976) captured this species in the Providencia region of Antioquia.

Chrysops variegatus (DeGeer)
(Fig. 29)

Tabanus variegatus DeGeer 1776, Mem. pour Servir a l'Hist. des Ins., VI, p. 230, pl. XXX, figs. 7, 8, ♀, Surinam.

Chrysops variegata: Bequaert 1940, Rev. Ent., 11(1-2):276-279, complete references. Fairchild 1942, Proc. Ent. Soc. Washington, 44(1):4-5 fig. 1. Philip 1955, Rev. Brasil. Ent., 3:66, 85, ♀, ♂, in key. Fairchild 1971, Cat. S. Amer. Dipt., Fasc. 28, p. 35, synonymy.

A small brownish yellow species with brown thoracic stripes, yellow abdomen with a pair of blackish brown dorsolateral stripes, mostly yellowish brown legs, and wings with a brown pattern which leaves a clear oval in center of discal cell.

Female. Length 5.0-8.0mm (N=20, \bar{x} =6.9mm). Frontal index 0.9-1.2 (\bar{x} =1.0). Frons slightly divergent below, yellow pollinose with

with sparse pale yellow hairs. A slightly raised dark brown ocellar tubercle bears 3 distinct ocelli; frontal callus pale brownish yellow, swollen, much wider than high. Eye pattern dark purple on iridescent green. Areas around antennal bases, along eye border, and lateral stripes below tentorial pits yellow pollinose, the remainder of the genae and frontoclypeus shiny pale yellowish brown. Antennal segment 1 yellowish brown, segment 2 brown, segment 3 brown basally with last 4 annuli blackish brown. Relative lengths of antennal segments, 1=30, 2=28, and 3=42 (1SD=2, 1, and 3). Antennal hairs brown to blackish brown. Palpi yellowish brown with sparse brown and pale yellow hairs. Palpi about as long as frons is high, somewhat inflated basally and bluntly pointed. Proboscis half again as long as palpi, brown, and wholly sclerotized except for labella. Beard of sparse pale yellow hairs.

Mesonotum subshiny brown with 4 broad yellow pollinose stripes, 1 on either side of the midline, which nearly meet anteriorly, and 2 laterally just above the wing bases. Scutellum yellow pollinose. Mesonotal vestiture of pale yellow and brown hairs corresponding to yellow and brown areas. Pleura yellowish brown in ground color, covered with sparse grayish yellow pollinosity except for yellow pollinose spots, 2 anteriorly and 4 below wing base. Legs yellowish brown with apical halves of protibiae and protarsi dark brown, and apices of meso- and metatibiae and tarsi dusky. Wings hyaline with brown markings as figured. Fairchild (unpublished 1978) writes, "the hyaline crescent may be either well marked or reduced to a diffuse paler area along outer border of cross-band, only the rounded

spot in first submarginal cell being distinct. Outer border of cross-band may be straight, convex, or slightly sinuous."

Abdomen pale yellowish brown with blackish brown dorsal markings varying in extent from 2 dorsolateral dashes on tergites 2 and 3 to large dorsolateral marks continuous with lateral dark stripes. The last few segments of some specimens are brownish. Vestiture is of numerous short yellow and brown hairs corresponding to yellow and dark areas of the integument.

Male. The males are like the females but are paler overall, the thoracic color paler brown, the yellow stripes wider and the abdominal dark stripes smaller. Inner two-thirds of eye with large whitish yellow facets with dark purple markings; small facets well demarcated, iridescent green with iridescent purple markings.

Distribution. Mexico to Argentina, West Indies. Colombia (Choco, Valle, Cauca, Antioquia, Santander, Magdalena, Meta, Putumayo, Vaupes).

Material examined. Cuba, 4^{♀♀}. Jamaica, 1[♀]. Mexico, 12^{♀♀}. Guatamala, 2^{♀♀}. Nicaragua, 2^{♀♀}. Costa Rica, 3^{♀♀}. Panama, 17^{♀♀}. British West Indies, 14^{♀♀}. Surinam, 3^{♀♀}. Dutch Guiana, 2^{♀♀}. French Guiana, 1[♀]. Brazil, 34^{♀♀}. Bolivia, 3^{♀♀}. Uruguay, 1[♀]. Paraguay, 1[♀]. Peru, 3^{♀♀}. Argentina, 1[♀]. Colombia: Choco; La Teresita, 22 June 1963, D. G. Young coll; Valle; Municipio de Candelaria near Cali, flight trap, cow and horse bait, 1[♀] 19 Dec. 1974, 1[♀] 16 Jan. 1975, 1[♀] 1♂ 27 Jan. 1975, 1[♀] 21 March 1975, 1♂ 23 March 1975; Cali, netted, 1[♀] 25 Nov. 1974; Cauca; Finca Corredor, near Caloto, netted and from flight trap, 22^{♀♀} 1♂ 21 Nov. 1974; Hacienda San Julian, 1100m, netted, 19^{♀♀} 9 July 1975; Guapi, netted and from CO₂ baited flight trap,

8⁰⁰ 9 Feb. 1976, 1⁰ 10 May 1976; Santander; Hacienda Florencia, 20km W San Vicente, W. A. Page leg. (See discussion for additional material I captured during the 12 hour horse bait and CO₂ baited flight trap captures.)

Discussion. *C. variegata* shows much variation over its entire range which is at this point not consistent enough to warrant recognition of additional taxa. It should be noted that in the study area of Valle and Cauca two phenotypically different populations exist, one in the Cauca Valley, the other represented by specimens from coastal Guapi. Both are represented in the above description. The Guapi material and the specimen from the Choco, La Teresita are slightly smaller, have darker more extensive abdominal markings and lack the small diffuse hyaline spot in the fourth posterior cell, present in the valley specimens. Only more extensive collecting and further study will show the relationship of these two groups.

At a site near Cali, Colombia, between Jan. 1975 and Feb. 1976, 26, 12-hr. captures from horse bait yielded 8 *C. variegatus*. All were taken in Nov. and Jan., and all but one after 1700hrs (5) or before 1000hrs (2). Temperatures at these times were between 21° and 27°C and RH between 58% and 91%. Cloudy conditions existed during 6 of the captures. All preferred to bite the ears or upper neck region of the animal.

At the same locality 20 additional daylight-hour captures using a CO₂ baited flight trap between Sept. 1975 and May 1976 yielded 14 specimens. Again almost all were caught after 1600hrs and before 1000hrs and most when it was cloudy or partly cloudy. Temperature

range during capture was between 21° and 31°C, most often about 27°C.

The flies were taken from Sept. through April.

Bequaert and Renjifo (1946) report the following records of *C. variegata* from Colombia. Antioquia; near Medellin; Procecito, Rio Porce. Magdalena; Tucurinca. Meta; El Caibe; Villavicencio. Putumayo; Puerto Limon; Mocoa. Santander; Puerto Olaya. Valle; Palmira, Hacienda La Carmelita, Rio Frio. Vaupes; between San Jose del Guaviare and Calamar.

Lee et al. (1969) caught 3 females from human bait in the Rio Raposo area in Oct. and March of 1963 and Feb. of 1965.

D. G. Young (pers. comm. 1978) and C. Porter (pers. comm. 1976) caught this species in the Choco, La Teresita and the Caucasia region of Antioquia respectively.

Genus *Dasybasis* Macquart

Dasybasis Macquart 1846, Dipt. Exot. Suppl. 11. Coscaron and Philip 1967, Rev. Mus. Argent. Cienc. Nat. Bernardino Rivadavia, Entomologia 2(2):15-266, figs. 1-113.

Members of the genus *Dasybasis* have bare or sometimes sparsely setose basicostas, usually pilose eyes which are unbanded or with a single stripe, are sometimes quite hairy, and have broad to moderately broad frons. Of the 5 subgenera only (*Dasybasis*) is represented, by 2 species, in Colombia, both found in the study area.

The bulk of the 93 neotropical species are found in temperate Argentina and Chile and thence northward at higher elevations in the Andes.

Key to *Dasybasis* species

1. Abdomen with distinct middorsal equilateral triangles on at least tergites 3 and 4 and triangles or white markings on 2 and 5. Wings with distinct clouds on the crossveins and small subapical clouds on at least all posterior veins. Femora blackish (Fig. 35). *schineri*
- 1'. Abdomen with small middorsal white spots on tergites 1-6. Wings with small clouds on the crossveins only. Femora pale reddish brown (Fig. 36). *montium*

Dasybasis montium (Surcouf)
(Fig. 36)

Tabanus montium Surcouf 1919, Miss. Mes. Arc. Merid. Equat., 10:299, ♀, fig. 31.

Agelanius montium: Bequaert and Renjifo 1946, Psyche, 53(3-4):88.

Dasybasis montium: Fairchild 1956, Smith. Misc. Coll., 131(3):23.

Archiplatius columbianus Enderlein 1925, Mitt. Mus. Berlin, 11(2):374-375, ♀. NEW SYNONYMY.

Dasybasis columbiana: Stone 1944, Bol. Ent. Venez., 3(3):137.
Cosacaron and Philip 1967, Segundas jornadas entomoepidemiologicas argentinas, 1:84, pl. 27.

Agelanius columbianus: Bequaert and Renjifo 1946, Psyche, 53(3-4):76.

A medium sized robust, hairy, blackish species with hairy eyes, bicolored pinkish brown and brown legs, wings with brown markings on crossveins, and abdomen with small middorsal white hair patches.

Female. (Colombian specimens) Length 10.5-15mm (N=18, \bar{x} =12.5mm). Frontal index 1.6-1.9 (\bar{x} =1.7). Frons 0.9-1.2 times as wide at base as at vertex, all but one specimen is divergent below (\bar{x} =1.1). Frons mostly pinkish gray pollinose with numerous long black hairs. Callus shiny dark yellowish brown, extending about one fourth up frons and touching lateral borders. Eyes densely pilose; greenish black, without bands. Subcallus, genae, and frontoclypeus pale yellowish gray pollinose with sparse dark hairs on subcallus and on upper genae near the eye; the frontoclypeus and lower genae covered with long dense pale yellow hairs. Antennal segments 1 and 2 light brown with sparse pinkish gray pollinosity and numerous black hairs; segment 3 black with a wide basal plate, an obtuse dorsal angle, and 4 short annuli. Palpi short, angular, bluntly pointed, pale yellowish white pollinose with long predominantly pale yellow hairs with a few black hairs

intermixed. Proboscis short, about as long as palpi, theca and labella blackish, membranous.

Mesonotum black in ground color, brown laterally; pollinosity gray with heavier gray pollinosity forming vague stripes laterally, along longitudinal sutures, and on midline. Vestiture is of long erect black hairs over entire surface with numerous short recumbent black and coppery red hairs corresponding roughly to dark and light areas. Scutellum as mesonotum. Pleura and coxae dark brown in ground color, densely covered with pale gray pollinosity, grayish yellow around wing base; vestiture of numerous long pale gray hairs. Legs pinkish with sparse pale gray pollinosity, the apices of the tibiae and the tarsi dark brown. Leg hairs pale gray, black on apices of tibiae and tarsi. Basicosta bare. Wings, as figured, hyaline with some brown on vein margins and brown spots on crossveins.

Abdomen above black, with sparse gray pollinosity; all segments with lateral pale gray areas, extensive on tergites 1 and 2, and small median pale spots. Vestiture of numerous black and pale gray hairs corresponding to light and dark areas. Abdomen below pale pinkish gray pollinose with a broad median dark gray stripe. Vestiture of long pale yellow hairs laterally and mostly long black hairs mesially.

Male. Not described.

Distribution. Ecuador, Venezuela, Bolivia, Colombia (Valle, Cauca, Cundinamarca).

Material examined. Bolivia, 1 σ^7 . Ecuador, 3 σ^7 (including 1 compared to type of *Dasybasis montium* Surcouf by G. B. Fairchild, 1964, with good agreement and 1 compared to types of *Archipylatus columbianus* Enderlein by G. B. Fairchild, 1963, with good agreement).

Colombia: Cauca; Parque de Purace, Lago San Raphael, 3500m, from CO₂ baited flight trap, at flowers, and attracted to man and cattle, 14♀♀ 10 March 1976; Parque de Purace, 3220m, 1♀ 18 Feb. 1965, V. Lee coll; Cerro de Munchique, 2450m, netted, 3♀♀ 7-8 Aug. 1975; Valle; above Tenerife in Paramo vegetation, 1♀ 1 June 1976, J. Ardila coll; Cundinamarca, Bogota, Monserrate, 3000m, 1♀ 15 Jan. 1943, G. B. Fairchild coll (compared to types *Archipilatus columbianus* Enderlein by G. B. Fairchild, 1963, with good agreement).

Discussion. Examination of the specimens compared to the types of *Tabanus montium* Surcouf and *Archipilatus columbianus* Enderlein along with comparison of the original descriptions shows no appreciable differences; I therefore have placed *A. columbianus* in the synonymy of the earlier *T. montium*. The two specimens compared to and in agreement with *A. columbianus* are a bit smaller and paler than the *T. montium* homotype. In addition the *columbianus* homotype from Ecuador has a frontal index of 2.7 compared to an average of 1.7 for all other specimens. I do not, however, consider these differences significant.

Bequaert and Renjifo (1946) report a male and a female of this species from Monserrate near Bogota. I have not examined this male.

Dasybasis schineri (Krober)
(Fig. 35)

Tabanus (Poecilosoma) schineri Krober 1931, Zool. Anz., 94:87, ♀.

Tabanus histrio: Wiedemann of Schiner, 1865:87, misident.

Agelanius orsonoi Bequaert 1946, Psyche, 53:486, ♀.

Dasybasis schineri: Coscaron and Philip 1967, Rev. Mus. Argent. Cienc. Nat. Bernardino Rivadavia, Entomologia 2(2):161.

The following is a translation from Spanish of the redescription by Coscaron and Philip (1967).

Medium sized species, distinctly marked, similar to *Poecilodesas* of Northern South America. *D. schineri* shows an indication of specialization since it possesses basicostae that vary from completely bare to setose. The setae reach approximately to the middle of the basicosta and are of the same type which are found on the adjacent costa. Frons of medium width, parallel sided to slightly divergent, with a large transverse dark brown to pale brown callus. Frons above with a moderately velvety wide ovoid reddish brown to black band; tubercle very small or absent, without ocelli. Antennae black, legs bicolored, and wings hyaline with distinct isolated clouds. Abdomen dorsally with wide pale bands and a line of white triangles which contrast with the dark background. The type of *A. osormoi* has a frontal index of 2.4; the antennae and palpi are not complete. The description of *D. schineri* with its variation follows:

Female. Length from 10.5-14mm. Eyes with dense brown hairs. Frontal index 2.0-2.4; callus as wide as frons sometimes with a rugose center. Frons with lateral erect black hairs and median elevated hairs directed toward the narrow point of the connection with the large velvety spot below. Antennae with a spherical scape and black erect hairs; antennal plate nearly a right angle dorsally. Beard white. Palpi elongated, varying from pale yellow to whitish gray with the majority of the hairs black to lightly gray and white.

Ornamentation of the thorax similar to *D. paulseni* (Phil.) of Chile and Argentina; dark brown dorsally with 2 gray submedian lines curved outward, where they join the borders of the prescutum and reach

the bases of the wings. Scutellum with the marginal border grayish; black in the center. In dark examples the wing clouds behind the stigma and at the apex of the discal cell tend to unite; all the marginal veins have small submarginal clouds. Legs black, tibiae with two-thirds to one half reddish brown, hind femur with a whitish row of hairs on the posterior border. The remainder are brown.

Abdomen with tergite 1 blackish; the rest dark brown toward the midline, including the area around the broad triangles on tergites 2-5. The third and fourth triangles are equilateral and nearly reach the preceding segments. Laterally abdomen is reddish brown. The lateral posterior borders of segments 2-5 pale as are the lateral anterior borders of tergite 2. Ventrally grayish brown with a more or less distinct wide median dark band. (1967, p. 161)

Distribution. Venezuela, Ecuador, Colombia (Cundinamarca, Huila.)

Material examined. La Vega (?Venezuela) 1[♀] (compared with type of *Phaeotabanus schineri* Krober by G. B. Fairchild, 1964, and with type of *Agelanius osornoi* Bequaert by C. B. Philip, 1965, "agrees"). Ecuador, Imbabura, Machetes, L. Leon coll 1[♀], (compared with type *Agelanius osornoi* by C. B. Philip, 1965, "agrees"). Colombia: Huila; 20km W Leticia, 2600m, from horse, 25 Feb. 1976, 1[♀], R. Wilkerson coll.

Discussion. This species is found in wet high altitude ecological zones above 2500m but apparently not in Paramo vegetation. The 3 specimens examined were 11-13mm in length and had frontal indices of 2.3, 2.5, and 3.3. The Huila example was taken from horse at 1200hrs noon with the sun shining.

Genus *Stenotabanus* Lutz

Stenotabanus Lutz 1913, Brasil Medico, 27(45):6. Fairchild 1942, Ann. Ent. Soc. Amer., 35(3):297-298, full references.

The genus is difficult to characterize since it is defined to a great extent by its lack of outstanding specializations. The species in the area under consideration are small to very small flies with bare basicostas, bare eyes with at least 2 bands, fleshy labella, antennae without a strong basal tooth or spine, the frontal callus usually as wide as frons, median callus not raised into a ridge, and usually a well marked tubercle at vertex.

Of the 8 neotropical subgenera and 74 species, 3 subgenera (one of which is new), and 10 species (5 new), were found in the study area.

Key to *Stenotabanus* Species

1. Tentorial pits shiny, not pollinose. Frons quite wide, index about 1.9. Frontal callus only half as wide as frons. Legs unicolorous pale brown. Abdomen with a middorsal pale, parallel sided stripe (*Brachytabanus*) *longipennis*
- 1'. Tentorial pits pollinose. Frons narrower, index greater than 3. Frontal callus as wide as frons. Legs and abdomen various 2
- 2(1'). Genae nearly bare, subshiny blackish. Mesonotum with 2 narrow blue green haired bands. Wings hyaline except for a distinct subapical dark patch. Scutellum contrasting, shiny golden yellow haired. Legs bicolored black and pale yellow (Fig. 8J-L) (*Stilbops*) n. subg. *roxannae* n. sp.

- 2'. Genae pollinose unless rubbed. Mesonotum without bands or contrasting hair markings. Wings hyaline or slightly smoky with at most an indistinct subapical darkened area. Scutellum not contrastingly golden yellow haired. Legs various. 3
- 3(2'). Legs wholly black. Mesonotum unstriped, the scutellum contrastingly whitish. Antennae dull orange. Wings greyish hyaline. Abdomen blackish with narrow posterior pale bands on all segments (Fig. 8D-F) . . . (*Stenotabanus*) *nigriculus* n. sp.
- 3'. Legs distinctly bicolored or at least not entirely black. . . . 4
- 4(3'). Abdomen with a distinct continuous pale middorsal stripe. Mesonotum with sparse to numerous shiny golden scale like hairs, the scutellum concolorous. 5
- 4'. Abdomen not striped, with at most a series of small middorsal triangles. Mesonotum without shiny golden scale like hairs, if shiny hairs are present they are blue green and the scutellum is more densely haired posteriorly 6
- 5(4). Middle and hind femora pale. Abdominal venter wholly pale yellow pollinose and short, pale yellow haired. Costal cell distinctly yellow tinted (Fig. 8M-O).
. (*Stenotabanus*) *luteolineatus* n. sp.
- 5'. Middle and hind femora black. Abdominal venter long golden yellow haired and yellow pollinose laterally and at segmental margins, the remainder dark with sparse black hairs. Costal cell hyaline (Fig. 8A-C). . . . (*Stenotabanus*) *chrysonotus* n. sp.
- 6(4'). Frons parallel sided. Abdomen above dark brown with pale posterior margins and small pale middorsal triangles, that of

- the second segment nearly touching posterior margin of the first. Legs pale brown, the tarsi dusky. Wings without an appendix at the fork of the third vein (Fig. 8G-I).
. (*Stenotabanus*) *brunneus* n. sp.
- 6'. Frons convergent below. Abdomen above brown to black, with or without pale posterior transverse segmental bands, sometimes widened in the middle, but not forming distinct triangles. Legs various. Wing with or without an appendix 7
- 7(6'). Abdominal venter wholly grayish pollinose. Femora wholly pale brown. Protibiae pale with a dusky apex, obscurely bicolored *detersus*
- 7'. Abdominal venter with at least some sternites dark haired in the center. At least hind femora dark brown, contrasting with paler tibiae. At least protibiae clearly bicolored. . . . 8
- 8(7'). Wholly blackish species. Wings with a large diffuse apical fumose patch. Fork of third vein with at most a very short appendix. (*Stenotabanus*) *sordidatus*
- 8'. Blackish species but abdomen with pale segmental bands and pleura with at least some pale pollinosity. Wing hyaline, at most slightly tinted 9
- 9(8'). Frons narrow, index 4.5-7.4. Antennae darkened, at least style black. Mesonotum and scutellum black, concolorous.
. (*Stenotabanus*) *obscurus*
- 9'. Frons broader; index 3.0-4.2. Antennae orange yellow. Scutellum pale pollinose at least on posterior margin
. (*Stenotabanus*) *incipiens*

Subgenus *Stenotabanus* Lutz

Subgenus *Stenotabanus*: Fairchild 1969, Arq. Zool. S. Paulo, 17(4):215-216.

These are mostly small to very small species with medium to narrow, generally parallel-sided frons with callus round or square, as wide as frons, and usually with a dark hair patch in middle of frons. Often there is a median callus and tubercle at vertex. Wings clear, fumose or spotted on crossveins. Eyes usually with 2 green bands. Abdomen various, banded, or with a median stripe or series of triangles. (Fairchild 1969, pp. 215-216)

Seven species, 3 of which are new, occur in the study area.

Stenotabanus (Stenotabanus) brummeus n. sp.
(Fig. 8G-1)

A small dark brown species with a small brown square shaped callus extended above into a thin line, dark brown third antennal segment, thorax unmarked, legs unicolorous brown, wings brown fumose, and abdomen with small middorsal pale brown triangles on tergites 2-5.

Female. Length 10mm; of wing 9mm. Eyes with short sparse hairs, the pattern (revived) is of a single median green stripe on a dark ground. Frons, antennae and palpi as figured. Frontal index 4.0. Frons parallel sided, dirty yellow pollinose. Tubercle raised, vestiges of ocelli present, a small shiny brown denuded area present around tubercle. Callus light brown, nearly obscured by pollinosity dorsally. Hairs black, sparse, most have been rubbed off. Subcallus, genae and frontoclypeus dirty yellow pollinose, the subcallus slightly darker, the area around the tentorial pits grayish. Genae with short sparse dark yellow hairs. Beard yellowish, short. Antennal segments 1 and 2 yellow orange, segment 3 black, yellow orange at the base.

Palpi pale yellow pollinose. Palpal hairs mostly black except some yellow ones on the basal half.

Mesonotum and scutellum pale brown, pale gray pruinose. Vestiture a sparse mixture of short black and yellow hairs, longer and predominantly yellow posteriorally. Pleura and coxae pale brown with quite pale yellow pollinosity. Vestiture of medium length pale yellow hairs. Profemora shiny brown ventrally, pale yellow pollinose dorsally. Femoral vestiture short black and longer yellow hairs ventrally and black hairs dorsally. Meso- and metafemora pale yellow, yellow haired. Protibia brown, darker toward apex, hairs predominantly yellow basally, blackish apically. Meso- and metatibiae yellow, brownish toward the apex. Hairs mostly yellow with some dark ones apically and dorsally. Protarsi dark brown, black haired, meso- and metatarsi brown with brown hairs. Halteres light brown. Basicosta bare. Wing unpatterned, tinted brown, no appendix at fork of third vein.

Abdomen brown dorsally with areas of yellow pollinosity laterally, along apical borders of each segment, and forming median, nearly contiguous triangles on tergites 2-6. Vestiture brown, yellow on yellow areas.

Male. Not known.

Distribution. Colombia (Valle).

Material examined. Colombia: Holotype, ♀, Valle, Tres Esquinas, Habana, Buga, 27 July 1942, J. Renjifo coll. Paratype, ♀, same data.

Discussion. Paratype has a frontal index of 4.3 and is 8mm long. It agrees well with the holotype. The generic position of this little species is questionable, as the frons is unusually narrow for

Stenotabanus and lacks the median black hair patch typical of that genus. Although complete, the specimens are not in optimum condition and final decision on relationships must await fresh material. Visits to the type area in 1975 proved fruitless, as no primary forest remained.

Stenotabanus (Stenotabanus) chrysonotus n. sp.
(Fig. 8A-C)

A small brownish fly with a metallic golden mesothorax, strongly bicolored legs, and a middorsal parallel sided light yellow abdominal stripe.

Female. Length 9mm; of wing 8mm. Eyes essentially bare with only a few very short hairs, metallic green with 3 deep purple stripes in life. Frons, antennae and palpi as figured. Frontal index 5.0. Frons yellow pollinose with a few short black erect hairs, denser and longer at the vertex. Vestiges of ocelli and a slightly raised tubercle present. Tubercle surrounded by a dark brown denuded area. Basal callus raised, blackish brown. Subcallus, genae and frontoclypeus yellow pollinose. Beard and the sparse hairs on upper genae and frontoclypeus yellow. Antennal segments 1 and 2 light yellow, basal plate yellow brown, annuli dark brown, contrasting with basal plate. Antennal hairs black. Palpi dark yellow with black and yellow hairs, the black hairs are shorter and predominantly on the apical two-thirds, the yellow hairs are longer and primarily basal. Proboscis short, labella fleshy.

Pronotum and scutellum grayish brown pollinose, grayish anteriorly. Vestiture of sparse short erect black hairs and dense short golden scale like hairs, more numerous posteriorly. Notopleural lobes brown

with longer black hairs. Pleura yellow pollinose above, grayish yellow below, the 2 colors separated by a black haired stripe from wing bases to notopleural lobes. Hairs yellow, denser below and in front of wing base. Legs strongly bicolored. Basal two-thirds of procoxae yellow pollinose, apical third brown. Vestiture of corresponding long yellow and shorter brown hairs. Pro- and metafemora blackish brown, black haired. Mesofemora brown, dark haired except for a patch of yellow basally on the dorsal aspect. Protibiae with basal half yellow, apical half blackish brown with corresponding yellow and dark hairs. Meso- and metatibiae mostly yellow and yellow haired with the apices brown and brown haired. Protarsi blackish brown with short black hairs. Meso- and metatarsi yellowish basally, blackish brown apically with brownish hairs. Halteres yellow brown, base of knob slightly darker. Basicosta bare. Wing venation normal except for an apparent aberration of the left wing which does not exhibit a crossvein at the base of the third posterior cell. Wings nearly hyaline with a barely evident brownish cast, more pronounced in the marginal and first submarginal cells. Stigma brown.

Abdomen dark brown pollinose dorsally with a middorsal light yellow stripe and lateral yellow areas. Vestiture of the brown areas is dark brown, of the stripe and sides yellow. On any given segment the stripe is equal to about one-fourth the total segmental width. It is parallel sided on segments 1, 2 and 3 and more or less irregular on 4-6 (slightly broader posteriorly). Sternites 1 and 2 have a brown ground color and pale yellow pollinosity, segments 3-7 are dark brown with a border of yellow pollinosity posteriorly and laterally on each segment. Vestiture of the first two segments is short yellow hairs, of the

remainder short dark brown or short yellow hairs corresponding to brown and yellow areas, so that the last 5 abdominal segments appear dark with narrow yellow segmental bands.

Distribution. Colombia (Valle).

Material examined. Colombia. Holotype, ♀, Valle, Rio Zabaletas, 4km E of Zabaletas, from flight trap baited with CO₂, 19 Oct. 1975, R. Wilkerson coll. Paratypes, 2♀♀, same data but 18 Aug. 1975.

The paratypes have frontal indices of 4.8 and 5.3 and are 10 and 9mm in length. They agree quite well with the holotype with the exception that one is slightly "greased" and the head and thorax appear darker.

S. chrysonotus is similar to other *S. (Stenotabanus)* species with a middorsal abdominal stripe such as *S. fulvistriatus* (Hine), *S. pseudotaeniotus* Krober, *S. pallidicornis* Krober, *S. peruviansis* Krober and *S. taeniotus* (Wiedemann). None of the above species has nearly as many mesothoracic and scutellar golden scale like hairs, and all have unicolorous yellow orange antennae. In addition *pallidicornis*, *taeniotus* and *fulvistriatus* have pale femora and grayish pleura, *pseudotaeniotus* has gray pleura and an appendix at the fork of the third vein and *peruviansis* has an appendix, completely hyaline wings, and a broader frons with callus as wide or wider than high.

Stenotabanus (Stenotabanus) detersus (Walker)

Tabanus detersus Walker 1850, *Insecta Saundersiana*, 1, Dipt., p. 31, ♀, Columbia.

Macrocornus detersus: Krober 1934, *Rev. Entom.*, Rio de Janeiro 4(2-3):303, references.

Stenotabanus detersus: Bequaert and Renjifo 1946, Psyche, 53:76.

Stenotabanus (Stenotabanus) detersus: Fairchild 1956, Smith.

Misc. Coll., 131(3):14.

A medium sized fly, dark brown above, whitish gray below, legs pale yellowish brown except for darkened tarsi. Wings unmarked, tinted brown.

Female. Length 8-10mm (N=7, \bar{x} =10). Frontal index 3.2-4.3 (N=7, \bar{x} =3.8). Frons 1.1-1.4 times wider at top than bottom (\bar{x} =1.2). Basal callus large, shiny brown or black, touching sides of frons. Median callus wide nearly half as high as frons. Tubercle and vestiges of ocelli present. Frons grayish to yellow pollinose; the middle third slightly raised and either dark brown or yellow depending on the incidence of the light. Eyes green with 2 purple bands in life. Subcallus yellow pollinose, genae and frontoclypeus gray pollinose. Antennal segments 1 and 2 brown, the third dark brown, reddish brown at the base; basal plate with slight dorsal angle. Palpi light yellow with long brown hairs except for white hairs at the base of the second segment and the entire first segment. Beard white. Proboscis short, labella fleshy.

Mesonotum and scutellum with mostly short black hairs and a few golden hairs. Pleura cream colored above changing to silver gray below with corresponding light brown and grayish white hairs. Procoxae cream colored and white haired. Femora and tibia light brown, silver gray pollinose with white hairs. Apices of protibiae and protarsi dark brown, meso- and metatarsi brown, dark haired. Halteres brown. Wings tinted brown, with an appendix at the fork of the third vein. Basicosta bare.

Dorsum of abdomen brown with short black hairs, posterior borders of all segments light yellow with some lateral pale hairs. Venter silver gray pollinose with short white hairs.

Distribution. Colombia (Valle), Ecuador.

Material examined. Ecuador, 2♂♂ (including one compared to the type of *S. deterrentus*). Colombia: Valle; Penas Blancas; all either from flight traps or horses, 2♂♂ 1-4 Aug. 1973, 1♀ 20 Oct. 1974, 1♀ 21 Jan. 1975, 1♀ 8 Oct. 1975; Lago Calima; 1♀ 13 March 1976.

Discussion. All specimens collected in Colombia agree with the above description. A homotype from Ecuador agrees except it is overall lighter in color and the palpi are mostly white haired with only a few brown hairs.

S. deterrentus is similar to *S. obscurus*; refer to *S. obscurus* for a discussion of the differences.

Stenotabanus (Stenotabanus) incipiens (Walker)

Tabanus incipiens Walker 1860, Trans. Ent. Soc. London, (N.S.) 5:275. Amazon region. Fairchild 1956, Smiths. Misc. Coll. 131(3):19. Type in London headless.

Stenotabanus (Stenotabanus) incipiens: Fairchild 1971, Cat. S. Amer. Dipt., 28, p. 46, synonymy.

Tabanus maculifrons Hine 1907, Ohio Naturalist, 8(2):222, ♀, Guatemala.

Stenotabanus maculifrons: Fairchild 1942, Ann. Ent. Soc. Amer., 35(3):304, fig. 8, ♀, Panama, Colombia, references.

A small blackish fly with a square swollen callus extended above into a thin ridge, palpi short grayish and pointed, scutellum pale,

legs bicolored black and pale yellow, wings hyaline, and abdomen blackish with pale apical borders.

Female. Length 6-8mm (N=11, \bar{x} =7.4). Frontal index 3.0-4.2 (\bar{x} =3.8). Frons convergent below, 0.5-0.9 (\bar{x} =0.65) times as wide as vertex. Frons yellow pollinose, with brownish pollinosity surrounding median callus. Basal callus swollen, square, the median callus a thin ridge extending slightly more than half distance to the vertex. Eyes bare, reddish bronze with two green stripes in life. Subcallus, genae, and frontoclypeus grayish yellow pollinose except for a brown pollinose band from eye to eye across the antennal bases. Antennal segments 1 and 2 yellowish brown and dark haired, segment 3 orange yellow, the basal plate not well produced, the dorsal angle slight. Palpi short, swollen basally and pointed, grayish brown pollinose with a mixture of brownish and pale yellow hairs. Beard is of short pale yellow hairs.

Mesonotum blackish brown, covered with sparse grayish pruinosity, and brown and shiny blue green scale like hairs. All or part of scutellum covered with dense grayish pollinosity and sparse pale hairs. Pleura brown pollinose with the mesoanepisternum and catapleurotergite grayish yellow pollinose. Legs dark brown and mostly brown haired except basal half of protibia and basal three-fourths of meso- and metatibiae which are pale yellow and shiny pale yellow haired. Wings hyaline, fork of third vein often with a short appendix.

Abdomen above dark brown, the posterior borders of each segment pale yellow pollinose with pale yellow hairs, the pale portion expanded slightly mesially to form low broad triangles. Tergites 1-2 with sparse grayish pruinosity. Below as above but with grayish pollinosity on sternites 1-2 and no median triangles.

Male. Easily associated with female. Eyes holoptic with a distinct tubercle at the vertex. Upper three-fourths comprised of large facets well demarcated from the small facets below. Palpi porrect, yellowish brown with long yellowish and brown hairs, ovoid and slightly pointed.

Distribution. Guatemala to Bolivia and Brazil. Colombia (Antioquia, Meta, Vaupes and unknown location on upper Magdalena River).

Material examined. Panama, 7⁰⁰₊₊ 1♂ (one ♀ compared to type of *Tabanus maculifrons*). Costa Rica, 2⁰⁰₊₊ 2♂♂. Honduras, 2♂♂. Peru, 1⁰₊ 1♂. Colombia: Vaupes; La Isla, Rio Apaporis, biting between scales of a caiman, 1⁰₊ 16 Feb. 1969, F. Medem coll.

Discussion. *S. incipiens* was not taken during this study but is found in Panama and other parts of Colombia; hence I include it here presuming its eventual discovery in the area considered. Other than the specimen examined from Vaupes, collections have been made in Antioquia, Providencia region (C. Porter coll); Meta, Restrepo, and Villavicencio; and on the upper Magdalena River, exact location unknown.

Fairchild (unpublished 1978) in his discussion of this species in Panama says most were taken in light traps, Shannon traps and in houses. However in Trinidad (Fairchild and Aitken 1960), 2⁰⁰₊₊ were collected attracted to man. The single Colombian specimen I examined was found biting a caiman.

Goodwin and Murdoch (1974) raised a female from a larva found in soil near a decaying log.

Stenotabanus (Stenotabanus) luteolineatus n. sp.
(Fig. 8M-O)

A small sized brownish species with a small basal plate and obtuse dorsal angle, short basally inflated pointed palpi, prothoracic legs brown with pale tibial bases, meso- and metathoracic legs yellowish brown, wings slightly fumose, and abdomen with a broad middorsal yellow stripe, the venter pale.

Female. Length 7mm; of wing 8mm. Eyes essentially bare with but a few very short hairs. Coloration of relaxed paratype specimen, 2 dark purple bands on metallic green background. Frons, antennae and palpi as figured. Frontal index 5.1. Frons only slightly convergent below, pale yellow pollinose with a small median area which becomes dark with the changing incidence of light. Tubercle slightly raised, vestiges of ocelli present, a small denuded, blackish brown area around tubercle. Callus blackish brown, somewhat swollen. Vestiture of sparse black hairs, more abundant and longer above. Subcallus, genae and fronto-clypeus pale yellow pollinose. Beard pale yellow, sparse. Antennal segments 1 and 2 pale yellow, segment 3 yellow orange. Antennal hairs black. Palpi pale yellow pollinose yellow haired except for a few dark hairs toward the apex. Proboscis short, brown pollinose, the labella wholly fleshy.

Mesonotum and scutellum brown with slight yellowish green pruinosity. Vestiture is of sparse short black hairs and yellow scale like hairs. Hairs denser and longer posteriorly. Pleura pale yellowish gray pollinose, hairs sparse, pale yellow. Coxae pale yellow pollinose with pale yellow hairs. Profemora brown with thin black hairs, meso- and metafemora yellow with pale yellow hairs. Protibiae with basal half

pale yellow, with pale yellow hairs, apical half and protarsi dark brown and black haired. Meso- and metatibiae yellow with a brownish tint at the apex, with corresponding pale yellow and black hairs. Meso- and metatarsi dusky. Halteres yellow. Basicosta bare. Wing venation normal, small appendix at fork of third vein. Apical half of left wing broken off, affixed to label. Wings slightly fumose. Costal cell and stigma brown.

Abdominal dorsum with ground color from front to back, brown to blackish brown with a more or less parallel sided medium yellow stripe a fourth as wide as abdomen extending into segment 6. All tergites yellow laterally. Median stripe with some yellow pollinosity. Vestiture of evenly distributed black and yellow hairs corresponding to brown and yellow areas, hairs longer on the posterior segments. Venter with mottled yellow and brown ground color on segment 1, 2 and 3, the remainder with brown ground color except for small lateral yellow areas. Venter yellow pollinose, throughout, densest on apical borders. Vestiture is of thin dark or yellow hairs corresponding to areas of brown and yellow ground color.

Male. Not known.

Distribution. Colombia (Cauca).

Material examined. Colombia. Holotype, ♀, Cauca, Guapi, mangrove swamp, CO₂ baited flight trap, 9 Feb. 1976, R. Wilkerson coll. Paratype, 1♀, same data as above.

Discussion. Paratype has a frontal index of 5.8, is 9mm in length and lacks antennae. It agrees quite well with the holotype.

St. luteolineatus is quite like *St. fulvostriatus* but differs by having 2 purple eye bands not 4, a much narrower frons,

and a wholly yellow venter. *Luteolineatus* differs from *St. pallidicornis* Krober by also having a narrower frons and fumose costal cell and apical area. *St. taeniotus* (Wiedemann) and *St. pseudotaeniotus* Krober do not have wholly pale haired abdominal venters as does *luteolineatus*. *St. peruviansis* has a wider frons and a dark brown abdominal venter with pale margins. The paratype lacks antennae and distal half of left wing.

Stenotabanus (Stenotabanus) nigriculus sp. nov.
(Fig. 8D-F)

A small blackish species with a rectangular callus extended above into a narrow ridge, palpi short black and pointed, scutellum pale and pale haired, legs black, wings nearly hyaline, and abdomen blackish with narrow pale posterior borders.

Female. Length 7mm; of wing 7mm. Eye essentially bare with only a few short sparse hairs; deep purple with 2 metallic green stripes in life. Frons, antennae and palpi as figured. Frontal index 5.7. Frons convergent below, pale yellow gray pollinose up to ocellar area which is dark brown. The middle third changes to an olive drab depending on the incidence of light. Vestiture is of short black hairs, longer and more numerous toward the vertex. Tubercle slightly raised, vestiges of ocelli present, area around tubercle denuded, blackish brown. Basal callus protuberant, blackish brown. Subcallus, genae and frontoclypeus light grayish yellow. Beard rather sparse and light yellow. Antennal segments 1 and 2 yellowish brown, segment 2 reddish brown. Antennal hairs black. Palpi grayish black and black haired. Proboscis black, wholly pollinose, labella fleshy.

Mesonotum dark brown, blue gray pruinose, with pale yellow spot laterally just anterior to the transverse sutures. Vestiture is of

short erect black hairs and recumbent shiny light yellow ones. Noto-pleural lobes dark brown with long black hairs. Anterior border of scutellum dark brown, brown haired, posterior three-fourths gray pollinose clothed with long yellow hairs. Mesoanepisternum and cata-pleurotergite yellow pollinose, yellow haired. Mesocatepisternum blackish brown in ground color and bluish gray pruinose. Other portions of the pleura dark brown pollinose. Legs unicolorous dark brown, brown haired. Halteres dark brown. Wing venation normal, basicosta bare. Wings nearly hyaline with a slight brown hue, stigma brown.

Abdominal groundcolor dark brown. Tergites 1 and 2 bluish gray pruinose. Tergites 3-6 with a pale yellow posterior border with pale yellow hairs. Remaining vestiture of evenly distributed dark brown hairs. Venter as above.

Male. Not known.

Distribution. Colombia (Valle).

Material examined. Holotype. Colombia: Valle; Rio Zabaletas, 4km E Zabaletas, flight trap, 6 July 1975, R. Wilkerson coll.

Discussion. *St. nigriculus* is similar to *St. incipiens* Walker but has unicolorous black legs, bicolored pale yellow and black in *incipiens*. In addition *St. nigriculus* has a much narrower frons. *St. minusculus* Krober is also similar but has pale yellow, not dark, palpi and distinct dorsal mesonotal stripes which *St. nigriculus* lacks. The abdominal pale bands of *nigriculus* also seem narrower than in either *incipiens* or *minusculus*.

Stenotabanus (Stenotabanus) obscurus Krober

Stenotabanus obscurus Krober 1929, Encycl. Entom. (b) Diptera 5:124, pl. 1, fig. 21, pl. 2, figs. 5, 35, pl. 3, fig. 51., Venezuela.

Stenotabanus (Stenotabanus) constabulorum Fairchild 1942, Ann. Ent. Soc. Amer., 35(3):304-305, fig. 6, a, b, ♀, Panama.

A medium sized species, blackish brown above, light gray below, legs dark except for coxae and basal parts of the tibiae, wings unmarked with a brownish cast.

Female. Length 8-10mm (N=12, \bar{x} =8.8). Eyes bare, purple with 2 green stripes in life, still faintly visible in some preserved specimens. Frontal index 4.5-7.4 (N=11, \bar{x} =6.0), frons 1.4 to 2.2 times wider at the top than at the base (\bar{x} =1.7). Basal callus dark brown, protuberant, median callus a ridge reaching midway up frons. Frons yellow pollinose with a large black to yellow patch in the middle, depending on incidence of the light. Ocellar area with little pollinosity, vestigial ocelli and a raised tubercle present. Subcallus yellow pollinose, genae and frontoclypeus gray pollinose. Third antennal segment reddish brown basally, dark brown on apical two-thirds. Basal plate with only a slight dorsal angle. Beard grayish white. Palpi light brown mostly brown haired except for a few whitish hairs basally. Mesonotum and scutellum blackish brown with sparse black and golden hairs. Pleura cream colored above, gray pollinose below, hairs grayish white. Coxae as the pleura. Femora blackish brown. Protibiae with basal halves yellowish, yellow haired, apical halves brown, dark haired. Meso- and metatibiae with apical fourth brown and brown haired, basal three-fourths yellow and light haired. Tarsi dark brown. Halteres

dark brown. Wings nearly hyaline, tinted brown, stigma brown. Small appendix at fork of third vein. Basicosta bare.

Dorsum of abdomen blackish brown, brown haired, apical margins of all segments yellow, more broadly yellow laterally especially on first 2 segments. First 3 sternites blackish brown with gray pollinosity, predominantly lateral, with vestiture of white hairs. Segments 4-7 blackish brown with some gray pollinosity laterally, vestiture light and dark corresponding to light and dark areas.

Male. Not seen by me from Colombia.

Distribution. Costa Rica, Panama, Colombia (Valle, ?Choco, Putumayo, Antioquia), Venezuela, ?Ecuador, eastern Peru.

Material examined. 12♀♀ 1♂ from Costa Rica, Panama and Peru. Colombia: Valle; Lago Calima, from livestock and a flight trap, 1♀ 25 July 1975, 1♀ 8 Aug. 1975, 1♀ 22 Aug. 1975, 1♀ 26 March 1976, 1♀ 24 March 1976.

Discussion. *S. obscurus* is very similar to *S. deterrentus*. However *S. obscurus* is smaller, $\bar{x}=8.8\text{mm}$ vs $\bar{x}=10\text{mm}$, has a narrower frons, index, $\bar{x}=6.0$ vs $\bar{x}=3.8$, a more widely divergent frons above, $\bar{x}=1.7$ times basal width vs $\bar{x}=1.2$ and a more protuberant ocellar tubercle. *S. obscurus* also has dark femora instead of light and a dark abdominal venter vs a wholly gray venter.

Bequaert and Renjifo (1946) report this species in Colombia, Putumayo, Urcusique. In addition, Porter (pers. comm. 1976) captured 41 specimens in the Providencia region of Antioquia.

This species appears to inhabit the Pacific side of the Andes only as far south as Lago Calima (Valle). It apparently ranges north around or across the Andes to Venezuela and south to Peru east of the Andes.

Stenotabanus (Stenotabanus) sordidatus Fairchild

Stenotabanus sordidatus Fairchild 1958, Ann. Ent. Soc. Amer., 51(6):525-526, fig. 6, ♀, Panama.

A small blackish species with yellow orange antennae, black recurved pointed palpi, unmarked thorax and abdomen, black legs with white tibiae, and fumose wings.

Female. The original description of Fairchild follows.

Length 8.0mm, of wing 8.1mm. Eyes bare, in life purplish black with two transverse blue stripes narrowly bordered with green, the stripes narrower than the interval between them, the lower one curved upward to nearly meet the clubbed end of the upper stripe, both failing to reach the eye margin posteriorly. Frons dark brownish grey pollinose, 4.3 times as high as basal width, nearly twice as wide at vertex as at base. Callus black, shiny, protuberant, as wide as frons, markedly higher than wide, with a narrow median raised ridge extending upward and flattening out into a somewhat rugose and ill-defined median callus. Vertex largely bare and shiny, though with a narrow pollinose strip next the eye margins, and with a small discrete tubercle showing vestiges of ocelli set in a yellowish area. Subcallus slightly inflated, in the three specimens at hand largely black and shiny but with irregular vestiges of brown pollinosity suggesting that in unworn specimens this area may have been thinly pollinose. Antennae not quite as long as frons, bright orange, the first two segments black-haired. Third segment slender, the basal plate markedly longer than style. Palpi black, black pollinose and black-haired, markedly inflated. Fronto-clypeus and genae dark grey pollinose with a brownish shade along the eye margin next the subcallus, wholly black-haired.

Mesonotum and scutellum black, subshiny, with sparse erect black hairs and semirecumbent, shining, brassy, somewhat ligulate hairs. Pleura and sternum black, dark grey pollinose, sparsely black-haired. Legs black and black-haired, except basal halves of fore tibiae and mid and hind tibiae and basitarsi, which are white and white-haired. The tips of the posterior two pairs of tibiae and the tips of the basitarsi are blackish and black-haired, as are the remaining tarsal segments. Wings with costal cell dark yellowish, stigma black, subcostal and base of marginal cell (1st R) proximal to stigma hyaline, rest of wing smoky, the marginal cell beyond stigma and first (3rd R) and second (4th R) submarginal cells almost black, the intensity of the

infuscation lessening gradually towards the hind margin. Halteres dark brown, the knobs a little paler. Abdomen black, subshiny, wholly black-haired, the first two tergites slightly greenish opalescent in certain lights. Sternites wholly black and black-haired.

(1958, pp. 525-526)

Fresh specimens have sparse pollinosity on the subcallus and are not shiny as stated above.

Male. Not known.

Distribution. Panama, Colombia (Antioquia).

Material examined. Panama, 6♀♀.

Discussion. Porter (pers. comm. 1976) reports this species for the first time from Colombia in Antioquia.

Subgenus *Brachytabanus* Fairchild

Subgenus *Brachytabanus* Fairchild 1942, Ann. Ent. Soc. Amer., 35(3):300.

Subgenus *Brachytabanus* is characterized by a very broad frons, a small protuberant callus, dark shiny tentorial pits, and third antennal segment with 3 annuli. One of the 2 described species occurs in the study area.

Stenotabanus (Brachytabanus) longipennis Krober

Stenotabanus longipennis Krober 1930, Encyc. Entom., Ser. B., Dipt. 5(1929), p. 125, pl. 1, fig. 23, pl. 2, fig. 7, 37, pl. 3, fig. 55, ♀, Venezuela.

Stenotabanus (Brachytabanus) longipennis: Fairchild 1942, Ann. Ent. Soc. Amer., 35(3):300-301, fig. 4, ♀, Panama; 1964, J. Med. Ent., 1(2):175, ♂.

A small brownish species with very wide frons, oblong, wider than high callus, shiny bare tentorial pits, yellowish brown legs, hyaline wings, and abdomen with a distinct middorsal parallel sided pale yellow stripe.

Female. Length 7mm. Frontal index 1.8-2.2 (N=4, \bar{x} =1.9). Frons grayish yellow pollinose with sparse brownish hairs, vertex with vestiges of an ocellar tubercle. Callus dark blackish brown, oblong wider than high, not touching sides of frons. Median callus a thin line connected to callus and reaching about two-thirds distance to vertex. The eye in life is blue green with three reddish purple bands with a reddish purple spot above next to the frons. Subcallus, genae, and frontoclypeus grayish yellow pollinose, the tentorial pits shiny, bare. Beard of sparse pale yellow hairs. Antennal segments 1 and 2 yellowish brown with brownish hairs. Segment 3 orange yellow, the basal plate flattened, the dorsal angle obtuse, not large. Annuli reduced to three. Palpi pale yellowish brown with a mixture of long pale yellow and brown hairs.

Mesonotum and scutellum brown with yellowish brown pollinosity and a mixture of dark brown hairs and shiny yellowish scale like hairs. Pleura and coxae pale gray pollinose with pale yellow hairs. Legs yellowish brown and pale yellow haired, the tarsi dusky. Wings with a slight brownish hue. Fork of third vein with a short appendix.

Abdomen above dark brown and brown pollinose with lateral pale grayish yellow stripes, widest on first tergites and tapering to a thin margin on the last. The middorsal stripe is pale yellow pollinose, nearly parallel sided, slightly narrower on last segment. Vestiture is of sparse short brown hairs, pale yellow on the stripes.

Abdomen below pale grayish yellow pollinose, pale yellow along apical margins, vestiture sparse pale yellow hairs.

Male. As female but paler. Eyes holoptic, the ocellar tubercle small and sunk between eyes. Large facets occupy most of eye, except for small area of small facets below. Subcallus with two velvety brown spots. Middorsal pale stripe not as distinct as in female.

Distribution. Costa Rica, Panama, Colombia (Valle, Boyaca, Meta, Santander Sur).

Material examined. Panama, 4♀♀ 1♂ (1♀ compared to type *Stenotabanus longipennis* Krober).

Discussion. Not taken during this study. Bequaert and Renjifo (1946) report it from Boyaca, Muzo; Meta, Villavicencio; Santander Sur, Bocas del Rosario, Rio Magdalena; and an unknown location on the Upper Magdalena River. In addition Lee et al. (1969) captured one specimen at human bait in Valle, Rio Raposo at human bait on 17 Sept. 1964.

Subgenus *Stilbops* n. subgen.

Stilbops ("shiny face") is proposed here for *Stenotabanus roxannae* n. sp. This species is close to *Diachlorus* but lacks the patches of pearly pollinosity on the pleura, has a different wing pattern, and has banded eyes.

It shares characters with *Stenotabanus* (*Stenochlorops*) such as a bare subcallus and genae, contrastingly pale haired scutellum, and a shiny black, unmarked abdomen. It differs, however, from *Stenochlorops* by having eyes with 2 iridescent dark blue bands on a black background and wings with a subapical costal brown patch.

Stenotabanus (Stilbops) roxanae n. sp.
(Fig. 8J-L)

A small shiny black species with a shiny brown subcallus, shiny black genae, thorax with 2 transverse iridescent blue green bands, scutellum golden yellow haired, legs bicolored pale yellow and black, and abdomen wholly shiny black.

Female. Length 9mm; of wing 7mm. Eyes bare, with 2 iridescent dark blue stripes on a black background surrounded by a shiny black border. Frons, antennae and palpi as figured. Frontal index 3.7. Frons slightly divergent above. Ocellar area shiny blackish brown with a slightly protuberant tubercle and vestiges of ocelli. Basal callus swollen blackish brown except for two diffuse brown marks beginning toward the center of the base and extending diagonally about half way up the callus. Frontal pollinosity pale gray below, blackish gray to gray above depending on incidence of the light. Subcallus swollen, shiny except for some pollinosity around antennal bases, pale brown except for dark brown area along the midline. Genae mostly shiny black except for silver gray pollinosity posteriorly and around tentorial pits. Frontoclypeus with black ground color and silver gray pollinosity. Beard silver gray. Antennal segments 1 and 2 yellow, base of basal plate yellow, the remainder brown, annuli a diffuse dirty yellowish brown. Antennal hairs black. Palpi shiny blackish brown with a small amount of silvery pollinosity, hairs black at the apex, the remainder silvery white and long. Proboscis dark brown pollinose, wholly fleshy.

Mesonotum dark brown with two transverse bands of greenish blue scale-like hairs, one beginning anterior to the transverse suture, the

other just before the posterior margin. Pronotal lobes brown. Vestiture of small erect black hairs anterior to first band on notopleural lobe, a few between the bands, and a denser patch along posterior border. Scutellum dark brown covered with dense golden yellow hairs. Pleura blackish brown, gray pollinose. Vestiture sparse, a few light yellow hairs. Coxae, trochanters and femora dark brown with dark brown hairs. Protibiae white basally, brownish yellow ventrally and apically, remaining tibiae white, dressed with fine white hairs. Protarsi yellow brown basally, the remainder dark brown, meso- and metatarsi mostly yellowish white except for apical segments. Halteres brown, dark brown at base of knob. Basicosta bare. Venation normal. Small appendix at fork of third vein. Wings hyaline (Fig. 8) except for brown costal cell, dark brown stigma, brown marginal cell and most of first submarginal cell, small cloud of brown at apex of second basal cell.

Abdomen somewhat distorted from capture. Dorsally unicolorous shiny blackish brown covered with short thin black hairs. Ventrally essentially the same except for a faint grayish pollinosity on segments 1 and 2.

Male. Not known.

Distribution. Colombia (Choco).

Material examined. Colombia. Holotype, ♀, Choco, between Rio San Juan and Rio Baudo, netted when attracted to man, 23 Feb. 1976, R. Wilkerson coll.

Discussion. This species is difficult to place in existing groups. It is close to *Diachlorus* but does not have patches of pearly pollinosity on the pleura, nor distinct dark apical wing patches, nor an eye pattern of lines and spots as *Chrysops*. It has characters in common with (*Stenochlorops*), such as the bare subcallus and genae, scutellum

contrastingly pale haired and a black shiny unmarked abdomen. I place it in the subgenus *Stilbops* ("shiny face") n. subgen., however, because, in addition to the above characters, it has the eye with 2 iridescent dark blue bands on a black background and the wings have a subapical costal brown patch. It appears to combine characters of the type of *Diachlorus*, *D. bicinctus* Fabricius and *Steno~~ch~~lorops*, and is one of those intermediate forms which, while seemingly indicating relationships between groups, makes the work of the taxonomist frustrating.

This species is named in honor of Roxann Ferguson who also has made the work of this taxonomist frustrating.

Genus Himantostylus Lutz

Himantostylus Lutz 1913, Mem. Inst. Osw. Cruz, 5(2):183-184.

Fairchild 1965, Psyche, 72(3):211-213, fig. 1

This monotypic genus is similar to *Lepiselaga* but has no shiny scale like hairs, has a normal discal cell, less black on the wings, the frontal callus is as wide as the frons, and it has distinct vestiges of ocelli. In addition the palpi and tibiae are swollen and the eyes are banded.

Himantostylus intermedius Lutz
(Fig. 37)

Himantostylus intermedius Lutz 1913, Mem. Inst. Osw. Cruz, 5(2):183-184, pl. 13, fig. 22, ♂, Yahuar Mayo, E. Peru. Stone 1934, Rev. Ent., 4(2):191-192, ♀, Canamina, Bolivia.

A small shiny black bee-like species with a shiny bare face, legs shiny black with pale yellow tarsi, wings basally black to ends of basal cells, the remainder smoky hyaline, and abdomen shiny black.

Female. Length 5-8mm (N=11, \bar{x} =7.2mm). Frontal index 2.7-4.0 (\bar{x} =3.3). Frons black in ground color with a median patch of pale gray pollinosity and upper area of sparse grayish black pollinosity. Ocellar tubercle at vertex present with 3 distinct pale brown ocelli. Callus blackish brown, swollen touching sides of frons, filling whole basal area, excavated above into an inverted triangle. Eyes with a purple black outline, a lower metallic green upward turned stripe, a median bright purple stripe which is contiguous with an upper metallic green stripe which has an outer extension angled back toward the vertex. Subcallus, genae and frontoclypeus shiny blackish brown. Beard with

sparse black hairs. Antennal segments 1 and 2 pale yellowish brown with sparse black hairs. Segment 3 dark brown, the basal plate elongated but as wide as other segments with a dorsal tooth. Palpi shiny blackish brown with numerous black hairs. Proboscis blackish brown pollinose with some lateral subshiny areas.

Mesonotum and scutellum blackish with sparse brown pollinosity and long erect black hairs. Pleura blackish brown with sparse grayish pollinosity and sparse black hairs. Legs shiny black except for pale yellow tarsi, the tibiae incrassate.

Abdomen shiny black with sparse dark brown pollinosity and black hairs.

Male. As female. Eyes holoptic with a distinct shiny tubercle at vertex. Palpi porrect, about 3 times longer than wide, shiny dark reddish brown with long brown hairs.

Distribution. Costa Rica, Panama, Colombia (Valle, Antioquia), Peru, Bolivia.

Material examined. Panama, 8⁰⁰₊⁰⁰₊, 1♂. Peru, 2⁰⁰₊⁰⁰₊. Colombia: Valle; Rio Raposo, 1⁰₊ 15 Sept. 1965, V. Lee coll; Rio Zabaletas, CO₂ baited flight trap, 1⁰₊ 19 Oct. 1975.

Discussion. This species was first reported from Colombia by Lee et al. (1967) on the Rio Raposo. It was caught resting at midday. Porter (pers. comm. 1976) reports it from the Providencia region of Antioquia. I caught a single specimen in a similar habitat as Rio Raposo on the nearby Rio Zabaletas.

The host of *H. intermedius* is not yet known. Fairchild (unpublished 1978) caught 59⁰⁰₊⁰⁰₊ in Panama as they flew low to the ground near a

"semi-permanent forest rain pool." They clustered around his boots and attempted to bite the rubber but would not bite his hands. He speculates tapirs, large frogs and basilisk lizards may be hosts since they are common in the area. Fairchild (1966) believes both *Himantostylus* and *Lepiselaga* to be mimics of stingless bees in the genus *Trigona*.

The two specimens examined from Peru match the original description in having only the basal cells black. The frontal indices (not included in above measurements) are 2.9 and 2.7, which is wider than ($\bar{x}=3.4$) the Panamanian and Colombian specimens.

Genus *Diachlorus* Osten Sacken

Diachlorus Osten Sacken 1876, Mem. Boston Soc. Nat. Hist., 2, Pt. 4(4):47. Fairchild 1942, Ann. Ent. Soc. Amer., 35(3):295, full references; 1972, Fla. Ent. 55(4):219-229, key.

The species of *Diachlorus* in the study area are characterized by eyes with spots and stripes similar to those of *Chrysops*, yellow and black overall coloration, pleura with a patch of pearly pollinosity, frontoclypeus bare and shiny, and black tipped wings.

Of the 20 neotropical species 2 occur in the study area.

Key to *Diachlorus* species

1. Frons over 5 times as high as basal width. Mesonotum with prominent isolated dark spots on each side anteriorly, and a broad median dark stripe with hair fine central yellow line.
..... *jobbinsi*
- 1'. Frons 4-5 times as high as basal width. Thorax without anterolateral dark spots, and median dark stripe divided by a broad yellow line widened posteriorly *curvipes*

Diachlorus curvipes (Fabricius)

Haematopota curvipes Fabricius 1805, Syst. Antl., p. 107, ♀,
South America.

Diachlorus curvipes Lutz 1913, Mem. Inst. Oswaldo Cruz, 5(2):145, pl. 12, fig. 1. Fairchild 1942, Ann. Ent. Soc. Amer., 35(3):296-297, fig. 3, full references; 1946, op. cit., 39(4):567, ♂.

A small yellow species with blackish markings. Frons narrow, 4-5 times higher than wide, thorax marked with a middorsal yellow line

but without anterior sublateral dark spots, legs bicolored pale yellowish brown and black, and wings with large apical spots.

Female. Length 8-10mm (\bar{x} =9.3mm). *D. curvipes* is quite similar to *D. jobbinsi* with the following exceptions: The frons is 4.0 to 4.8 (\bar{x} =4.3) times higher than wide (measurements taken from a sample of 11 Colombian and Panamanian specimens); the palpi are much more inflated; and the thorax has no sublateral anterior spots but does have a middorsal yellow stripe.

Male. As in female but paler overall and with the abdomen wholly yellow haired.

Distribution. Panama to E Peru and Brazil, Trinidad. Colombia (Choco, Antioquia, Valle, Cauca, Boyaca).

Material examined. Panama, 8♀♀, 1♂. Ecuador, 3♀♀. Brazil, 5♀♀. Peru, 1♀. Surinam, 2♀♀, 1♂. Trinidad, 1♀. Colombia: Choco; La Teresita, 1♀ 12 April 1967; Cauca; Gaupi, CO₂ baited flight trap, 1♀ 9 Feb. 1976; ?Vaupes; Rio Apaporis, La Isla, biting a caiman, 1♀ 15 April 1969, 2PM, Medem coll.

Discussion. *Curvipes* is quite similar to *D. jobbinsi*; the two may be separated by the characters in the key.

C. Porter and D. G. Young (pers. comm. 1976) captured this species in the Providencia region of Antioquia and at La Teresita, Choco respectively. Bequaert and Renjifo (1946) report it from Boyaca, Muzo and Valle, Veneral, Rio Yuromangui.

Diachlorus jobbinsi Fairchild

Diachlorus jobbinsi: Fairchild 1942, Ann. Ent. Soc. Amer., 35(3): 296, ♀, Panama; 1946, op. cit., 39(4):567, fig. 7; 1953, Proc. Ent. Soc. Washington, 55(5):241.

A small yellow fly with blackish markings. Frons slender, more than 5 times higher than wide, thorax with anterior sublateral dark spots, legs bicolored pale yellowish brown and black, wings with large apical spots, and last two abdominal segments black with black hairs. The following is the original description of Fairchild.

Female--Length 8-10mm, of wing, 7.5-9mm. Frons yellow-pollinose, 5.5 to 6 times as high as basal width, parallel sided. Frontal callus brown, narrower than frons, twice as high as wide and with a slender prolongation above. Fronto-clypeus black, shiny. Genae yellowish grey pollinose. Antennae yellow, the terminal annuli dusky. Palpi yellow, moderately inflated. Thorax mostly yellow pollinose. Mesonotum with a thick, dark trident-shaped figure in the middle, the prongs pointing anteriorly, and a pair of dark isolated shoulder spots. Pleura and sternum between fore and mid legs pearly, otherwise yellow pollinose. Scutellum dark at base, the apex yellow. Legs with all coxae and femora yellow, fore tibiae and tarsi black and black haired, mid tibiae and tarsi yellow, whitish at bases, hind tibiae yellow with some dark hairs, the tarsi whitish at base. Wings hyaline, tinged with yellow in the costal area, and with a black apical spot which includes the whole apex beyond the fork of the third vein, from the costa to the fourth vein (M_1), with sometimes a faint infuscation in the apex of the second posterior cell. Abdomen yellow, first tergite and a broad median stripe from second to fifth tergites yellow haired, otherwise black haired; the two terminal tergites black and black haired. Beneath, the vestiture is wholly yellow, except for the two terminal sternites. (1942b, p. 296)

Male. As female but paler overall. Larger eye facets occupy the upper two-thirds of the eye poorly demarcated from the smaller facets below. The abdomen wholly pale yellow and yellow haired except for last two segments which are slightly darker and wholly dark haired or with a mixture of light and dark hairs.

Distribution. Costa Rica to Ecuador. Colombia (Choco, Valle, Cauca).

Material examined. Costa Rica, 1♀. Panama, 15♀♀, 1♂. Ecuador, 1♀. Colombia: Choco; La Teresita, D. G. Young coll, 1♀ 10 April 1967, 2♀♀ 25-26 April 1967; Valle; Ladrilleros, 30km N Buenaventura, 1♀ 23 Jan. 1975; Bajo Calima, netted and CO₂ baited flight trap, 3♀♀ 5 Sept. 1975; Rio Raposo, Marinkelle coll, 1♀ 30 Jan. 1963; Rio Raposo, 1♀ "3-12-63," human bait; Cauca, Guapi, netted and CO₂ baited flight trap, 42♀♀ 9 Feb. 1976, 52♀♀ 5♂♂ 10 May 1976.

Discussion. This species is predominantly a coastal species in Colombia. It occurs with *D. curvipes* but is much more abundant.

A sample of 20 from Guapi (Cauca) showed a variation in length from 7.5-9.5mm (\bar{x} =8.5), and in frontal index of 5.3-6.2 (\bar{x} =5.8). *Jobbinsi* may be distinguished from *D. curvipes*, which is the other species in the genus found in northwest Colombia, by the characters in the key.

Lee et al. (1969), in the Rio Raposo fresh water zone, captured 28 females at ground level attracted to human bait. They found them active throughout the year. In addition, 211 others were processed for virus isolation and found negative.

Genus Hemichrysops Krober

Hemichrysops Krober 1930, Zool. Anz., 88(9-10):237.

This monotypic genus has a produced face, long proboscis, well developed ocellar tubercle, and mostly black wings.

Hemichrysops fascipennis Krober
(Fig. 38)

Hemichrysops fascipennis Krober 1930, Zool. Anz., 88(9-10):
237-238, figs. 9-10, ♀, Colombia. Fairchild 1964, J. Med. Ent.,
1(2):175-176, fig. 12, full references.

Tabanus (Hemichrysops) vecordis Fairchild 1956, Smiths. Misc.
Coll., 131(3):16. New name for *H. fascipennis* Krober nec. *Tabanus*
fascipennis Macquart 1845.

Hemichrysops (Hemichrysops) vecordis: Fairchild 1961, Rev. Biol.
Trop. 9(1):29.

A small blackish species without distinct body markings, a narrow frons, elongated face, unicolorous dark brown legs, and black wings with hyaline spots at the apices of the basal cells.

Female. Length 7.5-8.0mm (N=3). Frontal index 4.2-4.9. Frons slightly divergent below, blackish with dark gray pollinosity. The small ocellar tubercle bears vestiges of 3 ocelli. Callus dark brown, paler below, elongated and triangular reaching two-thirds distance to the vertex but not touching sides of frons. Eyes dark brown, no pattern noted. Subcallus, genae and sides of frontoclypeus blackish brown, with sparse gray pollinosity. Frontoclypeus rather elongated, about half as long as frons is high. Palpi dark brown with sparse grayish pollinosity and numerous blackish hairs; length almost that of

frons height, flattened, and much widened basally. Antennal segments 1 and 2 whitish yellow, black haired; segment 3 slender, only slightly wider than 1 and 2, pale brown, the annuli darker. Proboscis a third longer than palpi, dark brown and wholly fleshy. Beard of quite sparse dark brown hairs.

Mesonotum and scutellum dark brown with blue gray pollinosity, the numerous short hairs dark brown to yellowish brown, depending on light incidence. Pleura as mesonotum, with sparse mostly pale yellow hairs. Legs dark brown with blackish hairs except meso- and metafemora which are slightly paler. Basicosta with about 20 setae, smaller than those on adjoining costa. Wing dark brown, nearly black, with a hyaline spot as figured at the apices of the basal cells.

Abdomen above concolorous with mesonotum. Tergite 4 with a faint large middorsal pale haired patch, not underlain by pale pollinosity. Abdomen below dark brown with numerous short whitish yellow hairs.

Male. Fairchild describes a male from Rio Raposo (Valle) as follows:

The male is like the female in color, except that the hyaline area in the wings is smaller. The eyes are bare with an upper area of much enlarged and well demarcated facets covering about half eye area. There is a small tubercle sunk between the eyes at vertex. The antennae are dull yellowish, the style dusky. Palpi dull yellowish, shorter than in female and porrect, and with long sparse hairs. The abdomen also has long sparse pale hairs on sides of first 3 segments, and vestiges of a small white haired triangle in middle of tergite 4.

(Unpublished 1978)

Distribution. Costa Rica, Panama, Colombia (Valle).

Material examined. Panama, 2^{♂♂}. Colombia: Valle; Rio Raposo, 2300hrs, at light, 1♂ 17 Aug. 1965, V. H. Lee coll; Rio Zabaletas, 4km E town of Zabaletas, flight trap, 1[♀] 5 July 1975, R. Wilkerson coll.

Discussion. The hyaline spot on the wing is smaller in the Colombian specimen than in those from Panama and Costa Rica.

Genus *Bolbodimyia* Bigot

Bolbodimyia Bigot 1892, Wien. Ent. Zeit., 11:162. Krober 1929, Encycl. Ent., B, Dipt., 5:109-112. Stone 1954, Ann. Ent. Soc. Amer., 47(2):248-254, keys, synonymy.

A distinctive group which has the first antennal segment and subcallus swollen, first submarginal cell narrowed, tibiae somewhat inflated, wing apex hyaline, and the eyes with the upper portion unicolorous, the lower portion speckled.

Six of the 11 described species were taken in the study area.

Key to *Bolbodimyia* species

1. Largely bright orange yellow species, the wing basally yellow, the abdomen yellow with 2 broad dorsolateral blackish stripes above *galindoi*
- 1'. Dorsally black species, the wing without yellow, the abdomen wholly black above. 2
- 2(1'). Hyaline apex of wing extending into first submarginal cell (third R). Mid and hind tarsi largely white. First antennal segment but slightly inflated. Frons and face entirely orange, remainder of insect including appendages black. . . *erythrocephala*
- 2'. Hyaline apex of wing confined to second submarginal cell (fourth R). All tarsi black. First antennal segment strongly inflated. 3
- 3(2'). Head, thorax and abdomen wholly black *nigra*
- 3'. Head, pleura, or abdomen with at least small orange areas . . 4
- 4(3'). Thorax, and abdomen wholly black and black haired, at least

- first segments of meso- and metatarsi pale. Head orange. . .
 *erythrocephala*
- 4'. Pleura with at least small patches of orange hairs. Tarsi
 black. Head black or orange 5
- 5(4'). Frons, face, pleura, and venter of abdomen orange and orange
 haired. *philipi*
- 5'. Frons shiny black. Face, pleura, and venter variously colored.
 6
- 6(5'). Genae, frontoclypeus, pleura, and venter of abdomen orange and
 orange haired. Femora orange basally. *bicolor*
- 6'. Beard and pleura with a small patch of orange hairs, abdominal
 venter black. Legs wholly black. *celeroides*

Bolbodimyia bicolor Bigot

Bolbodimyia bicolor Bigot 1892, Wien. Ent. Zeit., 11:162. Von
 Roeder, 1892, 11:237. Kroeber 1929, Encyc. Ent. Dipt., 5:109.
 Bequaert and Renjifo 1946, Psyche, 53(3-4):65.

A striking medium sized fly, black above and bright orange
 ventrally. Legs bicolored orange and black, and wings black with a
 hyaline tip reaching to end of upper fork of third vein (R_4).

Female. Length 11-12mm (N=11, \bar{x} =11.6mm). Frontal index 2.4-
 2.9 (\bar{x} =2.6). Frons divergent below, 1.6-1.9 times wider than vertex
 (\bar{x} =1.7). Eye with upper third dark green, lower part metallic reddish
 orange specks on dark green. *Bicolor* is quite like *B. nigra* morphologi-
 cally and in dorsal coloration. It differs however in ventral coloration.
 Frontoclypeus and genae are yellowish orange with concolorous
 pollinosity and hairs. Palpi vary from wholly yellow orange to

entirely blackish but most have the apical third dark; vestiture is concolorous. Pleura, pronotal lobes, and coxae yellowish orange, orange haired; the hairs numerous on the upper pleura. The procoxae are dark apically in some specimens. Legs variable from entirely black in some to those with basal half of protibiae, two-thirds of mesotibiae, and two-thirds of metatibiae orange brown. Abdomen below and lateral areas of tergites 1 and 2 dark yellow orange with numerous short yellow hairs.

Male. Quite like female in structure and color. Eyes contiguous, upper two-thirds large facets well differentiated and demarcated from the small ones below. Palpi porrect, about 4 times longer than wide. Proboscis with labella blackish brown pollinose. Antennae as female, the second and third segments more slender, pale yellow, the annuli darkened. Wings with hyaline tip as female, costal margin blackish following vein R_5 the remainder paler grayish black. Abdominal tergites 5-7 reddish black and black haired.

Distribution. Venezuela, Colombia (Choco, Valle, Meta).

Material examined. Panama, 1♂. Colombia: Choco; between Rio San Juan and Rio Baudo, CO₂ baited flight trap, 1♀ 23 Feb. 1976; Valle; Lower Anchicaya, 400m, CO₂ baited flight trap, 2♀♀ 16 Aug. 1975; 41km E and 21km N Buenaventura, 140m, CO₂ baited flight trap, 1♀ 19 March 1976; Cali and vic. 3-4000ft, 1♀ 20 Jan. 1972, H. E. Evans, coll; Rio Zabaletas, netted, 1♀ 18 Aug. 1975; Penas Blancas; from bait horse, 1750m, 2♀♀ 17 June 1975, 1♀ 10 July 1975; Meta; Restrepo, 500m, 1♀ 1936 (compared to and found agreeing with type of *B. bicolor* Bigot by G. B. Fairchild 1953); Villavicencio, 1♀ 28 Nov. 1944, 1♀ 15 Dec. 1941.

Discussion. I believe *B. philipi* Stone may be synonymous with or a subspecies of *B. bicolor*. Stone (1954) states it differs from *bicolor* by having all black hairs on the notopleural lobe (prealar callus), usually a wholly orange frons and subcallus, and all femora orange with apical half, fourth, and fourth of pro-, meso-, and metafemora respectively black. Some specimens of *bicolor* examined exhibit black hairs on the notopleural lobes and legs as described for *philipi*. Some specimens of *philipi* have a darkened frons and subcallus. Only larger series of specimens can explain this apparent continuous variation. I can detect no structural differences, such as separate *erythrocephala* and *dampfii*, between *bicolor*, *philipi*, *celeroides*, and *nigra*, although most specimens will key out on the color characters in the key.

Bolbodimyia celeroides Stone

Bolbodimyia celeroides Stone 1954, Ann. Ent. Soc. Amer., 47(2): 248-254.

A medium sized nearly entirely black species with yellow orange lower genae and upper pleura, unicolorous black legs, and black wings with a hyaline tip which extends to the end of the upper branch of third vein (R_4).

Female. Length 12-13mm (N=8, \bar{x} =12.6). Frontal index 2.3-2.6 (\bar{x} =2.4). Frons divergent below 1.4-1.8 (\bar{x} =1.6) times wider than at vertex. *B. celeroides* is nearly identical to *B. nigra* structurally but has patches of yellow orange pollinosity and hairs on the lower genae, pronotal lobes, and just below and in front of wing bases.

Male. Not known.

Distribution. Peru, Colombia (Valle, Meta).

Material examined. Peru, 1♀. Colombia: Valle; Lago Calima, from livestock, 4♀♀ 22 Aug. 1975, 1♀ 4 Sept. 1975; Penas Blancas, from bait horse, 1♀ 12 Aug. 1975, 1♀ 6 Nov. 1975, 1♀ 29 Jan. 1976.

Discussion. The above description is of material collected in Colombia. The specimen in the collection of G. B. Fairchild from Peru differs by having entirely yellow orange genae and frontoclypeus and a more extensive orange area on the pleura which occupies approximately half the upper pleural area.

One specimen was captured at the end of Jan. 1975 during a horse baited biting study. It was taken from between the hind legs at 1240hrs during sunny weather, temp. 24°C, RH 72%.

Bolbodimyia erythrocephala (Bigot)

Atylotus erythrocephalus Bigot 1892, Mem. Soc. Zool. France, 5:668, ♀, Panama.

Bolbodimyia erythrocephala: Fairchild 1942, Ann. Ent. Soc. Amer., 35(3):294, full references. Stone 1954, Ann. Ent. Soc. Amer., 47(2):252-253.

A medium sized species, wholly black except for yellow-orange frons, subcallus, genae, frontoclypeus and first 2 antennal segments, and pale meso- and metatarsi. First antennal segment not greatly enlarged. Wings black with a hyaline tip which extends into apical end of first submarginal cell.

Female. Length 10-11mm (N=6, \bar{x} =10.3). Frontal index 2.0-2.3 (\bar{x} =2.2). Frons divergent below, 1.3-1.5 (\bar{x} =1.4) times wider than vertex. Frons yellowish orange with sparse pale gray pollinosity above

and laterally next to the slightly raised callus; the callus and median triangular area above it shiny. Eye color blackish above with greenish mottling on a blackish background below. Subcallus shiny yellowish orange and swollen. Genae and frontoclypeus yellowish orange with concolorous pollinosity; vestiture of genae sparse short orange hairs above, more dense below; vestiture of frontoclypeus sparse short orange and black hairs. Antennal segment 1 mostly shiny yellow orange, not greatly inflated, about as wide as basal plate; vestiture mostly basal and ventral short dark hairs; segment 2 yellowish brown, dark haired; segment 3 of 4 annuli and an elongated slender basal plate, which is slightly widened basally and has an obtuse dorsal angle. Segment 3 brownish basally to blackish apically. First palpal segment yellow orange, mostly orange haired; second segment blackish covered with short black hairs. Proboscis a third again as long as palpi, black and wholly fleshy.

Mesonotum and scutellum black with dark brown pollinosity and numerous short black hairs. Pleura and coxae black in ground color with dark grayish brown pollinosity and black hairs, most numerous below wing base. Legs blackish and dark haired except for basitarsi of meso- and metathoracic legs which are pale whitish yellow, dusky at the apices and with short dark hairs above and yellowish hairs below. Wings blackish, paler posterior to the third vein with a hyaline apical area which extends into the apical end of first sub-marginal cell.

Abdomen black with short black hairs. Dorsum with some blue gray pruinosity, venter dark brown pollinose.

Male. Not known.

Distribution. Costa Rica, Panama, Colombia (Valle).

Material examined. Panama, 5♀♀. Colombia: Valle; 41km E and 20km N Buenaventura, CO₂ baited flight trap, 1♀ 19 March 1976; Rio Zabaletas, CO₂ baited flight trap, 1♀ 19 Oct. 1975.

Bolbodimyia galindoi Fairchild

Bolbodimyia galindoi Fairchild 1964, J. Med. Ent., 1(2):172, fig. 5, ♀, Panama.

The following is the original description of Fairchild.

A predominantly orange-yellow insect, thorax with a middorsal black streak, abdomen black laterally, wings black and yellow.

♀. Length 13mm; wing 11mm. Frons about 2x as high as basal width, narrowed above, bright orange pollinose. Basal callus black, raised above eye level. Subcallus greatly inflated, wholly shiny, black with a median yellow band. Clypeus and genae pollinose, orange rufous, latter with sparse orange-red beard. Antennal segment 1 greatly inflated, nearly spherical, as wide as long, black and shiny but beset with black hairs basally. Segment 2 normal, yellowish brown pollinose and with an acute dorsal angle. Segment 3 blackish brown, paler basally, long and slender, basal plate with a strong dorsal angle; style 4 segmented, shorter than plate. Palpi curved, somewhat inflated, orange-brown, becoming dusky at apex, clothed with orange hairs basally, black apically. Eyes with characteristic pattern of the genus.

Thorax bright orange in ground color except for a broad median dorsal black streak from near the anterior margin to scutellum, clothed with bright orange-red hairs, except for black hairs on the black streak. Scutellum orange, subshiny, with rather sparse erect blackish hairs. Wings with membrane and veins basally bright orange-yellow, color extending to beyond end of subcostal vein, in a streak below R2+3, to and including crossveins at base of discal cell and apex of 2nd submarginal cell. Axillary area and hind margin to about end of Cu also orange yellow. Apex of wing from just distal of end of Sc almost to tip jet black, this color extending to R2+3 and to margin above R4, leaving an apical hyaline crescent. Behind the yellow streak in first posterior cell, the wing is blackish infuscated, or dark greyish hyaline. Legs black and black-haired, except for yellow basal halves of

all femora, coxae and mid and hind basitarsi. All tibiae considerably inflated.

Abdomen orange, orange-haired, except for a pair of broad black and black-haired dorsolateral bands extending the length of the abdomen. Mesal sides of these bands are parallel, their outer sides diverging posteriorly, so that the bands are narrowest anteriorly and leave much of the sides of tergites 1-2 orange. Sternites orange and orange-haired. (1964, p. 172)

Male. Undescribed.

Distribution. Panama, Colombia (Antioquia).

Material examined. Panama, 1♀. Colombia: Antioquia; Rio Anorí Valley, 1♀ 19 June 1971, C. H. Porter coll.

Discussion. The two specimens I have examined are 12mm long, have frontal indices of 2.3 and 2.7, and have the frons divergent below, 1.1 and 1.3 times width at vertex.

The Panama specimen differs from the above description in color. The frons is pale yellow orange pollinose, the frontal callus is pale yellow brown, and the remainder of the areas described as orange, bright orange red or orange yellow are all much paler yellow or pale orange yellow. The palpi are yellowish brown and dark brown and the abdomen below has 2 brown, yellow orange haired, broad sublateral stripes. In other respects the specimen agrees with the description.

The specimen taken in Antioquia is closer in color intensity to the description. The frontal callus is yellowish brown and the palpi wholly orange yellow haired. It does differ, and perhaps significantly, from the description and the Panama specimen by having only a few dark middorsal thoracic hairs in place of the distinct dark stripe and by having a diffuse yellow orange middorsal abdominal stripe with only slightly darker lateral areas instead of a distinct pale stripe bordered by dark bands. In addition the abdomen below of the Antioquia example is without markings, as the holotype.

The wing of the specimen from Antioquia is similar to Fairchild's figure (1964) and the Panama example but the dark upper band is narrower and extends nearly to the base of the marginal cell and the hyaline tip is slightly smaller.

The high degree of variability of such a small sample suggests either the existence of more than one species or of a single heterogeneous species. More material is an obvious necessity before coming to even a tentative decision.

Bolbodimyia nigra Stone

Bolbodimyia nigra Stone 1934, Rev. Entom. 4(2):190-191.

A medium sized entirely black species with bulbous shiny black subcallus and first antennal segment, and wings blackish except for a hyaline tip which reaches to end of the upper third vein (R_4).

Female. Length 11-14mm (N=10, \bar{x} =12.7mm). Frontal index 2.2-2.7 (\bar{x} =2.5). Frons divergent below, 1.4-1.9 times wider than vertex (\bar{x} =1.7). Frons shiny black to deep reddish brown with sparse lateral grayish pollinosity; frons swollen below. Eye deep blackish purple above with greenish red mottling on blackish purple below. Subcallus shiny black as frons, quite swollen. Genae and frontoclypeus blackish brown with dark brown pollinosity and sparse dark hairs. Antennal segment 1 large and bulbous, about as thick as subcallus is high, shiny black with a few mostly basal dark hairs; segments 2 and 3 dark brown, grayish brown pollinose. Segment 3 of 4 annuli and an elongated basal plate, slightly widened basally with an obtuse dorsal angle. Palpi blackish brown covered with short black hairs. Proboscis half again as long as palpi, blackish and fleshy.

Mesonotum and scutellum black in ground color with dark gray pollinosity and numerous short black hairs. Pleura and coxae blackish with dense brown pollinosity above and sparser grayish brown pollinosity below; vestiture short dark brown hairs around wing base. Legs entirely black to deep reddish brown with sparse dark gray pollinosity and black hairs; tibiae incrassate and shiny dorsally. Wing black with a hyaline tip which reaches the end of the upper third vein (R_4).

Abdomen black, blue gray pruinose above with dark gray pollinosity below; vestiture of short black hairs.

Male. Not known.

Distribution. Ecuador, Peru, Colombia (Valle, Meta).

Material examined. Colombia: Valle; Penas Blancas, 1750m, from bait horse, 1♀ 30 Dec. 1974, 1♀ 17 June 1975, 1♀ 26 June 1975, 1♀ 1 March 1975; 41km E and 20km N Buenaventura, CO₂ baited flight trap, 1♀ 22 Nov. 1975; Lago Calima, 8km below dam, livestock and CO₂ baited flight trap, 1♀ 8 Aug. 1975, 1♀ 2 Oct. 1975, 1♀ 13 March 1976; Meta; Villavicencio, 2♀♀ 29 Oct. 1941.

Bolbodimyia philipi Stone

Bolbodimyia philipi Stone 1954, Ann. Ent. Soc. Amer., 47(2):253.

I believe this species to be perhaps conspecific with *B. bicolor*; it was not, however, taken in the study area. I refer to it here and in the key since its distribution ranges from Guatemala to Colombia (Antioquia and Boyaca) and therefore probably Choco. See *B. bicolor* for a discussion of the material I have examined from these two taxa.

Genus *Selasoma* Macquart

Selasoma Macquart 1838, Dipt. Exot., 1(2):187. Fairchild 1942, Ann. Ent. Soc. Amer., 35(3):289, full references; 1965, Psyche, 72(3): 210-211.

This monotypic genus is characterized by much inflated tibiae and palpi, shiny black face and subcallus, basal plate much longer than annuli with an obtuse dorsal angle, and labella wholly fleshy. Wings with the basal halves black, the basicosta has a few short setae and the abdomen is shiny bluish black.

Selasoma tibiale (Fabricius)
(Fig. 39)

Tabanus tibialis Fabricius 1805, Syst. Antl., p. 102.

Selasoma tibiale: Lutz 1913, Mem. Inst. Oswaldo Cruz, 5(2):179, pl. 13, fig. 21, ♀, ♂. Fairchild 1942, Ann. Ent. Soc. Amer., 35(3): 289, full references; Psyche, 1965, 72(3):210-211.

A distinctive shiny blackish species with a wide flattened basal plate, large swollen palpi and tibiae, and basal half of wing black.

Female. Length 10-14mm (N=11, \bar{x} =11.3mm). Frontal index 4.5-6.0 (\bar{x} =5.2). Frons slightly convergent below, mostly shiny blackish, raised and rugose with sparse grayish pollinosity on either side of the callus. Callus shiny blackish, drop shaped. Eyes greenish black in life. Subcallus shiny dark brown. Genae and frontoclypeus dark brown with sparse grayish pollinosity. Antennal segments 1 and 2 shiny dark brown with short black hairs; segment 3 dark with a broad flattened basal plate and 4 short annuli. Palpi shiny dark brown, large and swollen almost as long as frons is high, vestiture is of many short dark

brown hairs. Proboscis large, dark, as long as palpi, and wholly fleshy. Beard sparse short dark hairs.

Mesonotum and scutellum dark brownish black or reddish brown with sparse pale gray pollinosity and dark hairs. Pleura and coxae dark brown and brownish pollinose except for large shiny patches on each side between the pro- and mesocoxae. Pleural vestiture mostly of sparse dark hairs, more numerous below wing base. Legs shiny blackish brown with numerous dark hairs, tibiae greatly swollen. Basicosta with a few short setae. Wing blackish on basal half, as figured.

Abdomen shiny bluish black except for some sparse concolorous pollinosity on first 2 segments. Vestiture is of quite numerous but short and inconspicuous dark hairs.

Male. Not seen by me, but described and figured by Krober (1929).

Distribution. Mexico to N Argentina, Trinidad. Colombia (Antioquia, Meta).

Material examined. Panama, 8♂♂. Venezuela, 1♀. Surinam, 1♀.

Discussion. *S. tibiale* is a widespread but uncommon species. C. Porter (pers. comm. 1976) captured it in the Providencia region of Antioquia, and a single specimen is reported by Bequaert and Renjifo (1946) from Meta, Villavicencio.

Fairchild (unpublished 1978) indicates that in Panama *tibiale* is nocturnal and has been taken attacking man and animals. Lutz (1913) says the species is crepuscular and bites horses on the belly.

Genus *Chlorotabanus* Lutz

Chlorotabanus Lutz 1909, Inst. Osw. Cruz em Manguinhos, p. 30.
Fairchild 1940, Rev. Ent., 11(3):714, full references. Philip and
Fairchild 1956, Ann. Ent. Soc. Amer., 49(4):313-324, keys. Fairchild
1969, Arq. Zool. S. Paulo, 17(4):208.

This genus is easily recognized by its pale green coloration, lack
of a frontal callus, sclerotized labella, and unicolorous eyes. All
are crepuscular or nocturnal. It is separable from similarly colored
species of *Cryptotylus* by lacking a frontal callus and lacking a shiny
dorsal tooth or spine on antennae.

Of the 6 described species, 3 are found in the study area, one
of which is new.

Key to *Chlorotabanus* Species

1. Wings with distinct dark spots on all crossveins and at tips
of longitudinal veins. All tibiae black haired at tips 2
- 1'. Wings without black spots, glass-clear, only costal cell
yellowish. Tibiae wholly pale haired *inanis*
- 2(1). Frons narrower, index greater than 7.0. Thorax brown in
ground color with pale grayish pollinosity and yellow to golden
yellow hairs. Abdomen yellowish brown in ground color with
occasional green areas. Hairs dark yellow (Fig. 9A-C).
. *fairchildi* n. sp.
- 2'. Frons broader, index less 7.0. Thorax pale green in ground
color with pale gray pollinosity and pale yellow hairs. Ab-
domen greenish in ground color with shiny pale brassy hairs . .
. *mexicanus*

Chlorotabanus fairchildi n. sp.
(Fig. 9A-C)

A medium sized brownish yellow to pale brownish green species with a narrow frons, yellow mesonotal hairs, dark hairs at the apices of the tibiae, and hyaline wings with spots on the crossveins.

Female. Length 12mm; of wing 10mm. Eyes bare, dull brown in life. Frons, antennae and palpi as figured. Frontal index 7.3. Frons pale yellow pollinose with short yellow hairs. Callus, tubercle and ocelli absent. Subcallus, genae and frontoclypeus light yellow pollinose. Vestiture of a few short hairs on the sides of the subcallus and a moderate number of medium length hairs on the genae and frontoclypeus. Beard yellow. Antennal segments 1 and 2 yellow, yellow haired. Third segment with the basal plate mottled green and yellow green, annuli yellow green at base, brownish toward tip. Palpi yellow, yellow haired. Proboscis wholly shiny, sclerotized, the labella black.

Mesonotum light grayish yellow pollinose. Hairs numerous straw colored (darkish yellow) mesially and light yellow and longer laterally. Scutellum light grayish yellow pollinose anteriorly, a mixed leaf green and yellow green posteriorly. Vestiture yellow and as dense as on mesonotum. Pleura light grayish yellow pollinose, hairs light yellow rather dense and long above, sparse below. Coxae and femora yellow pollinose, yellow haired. Pro- and mesotibiae light brownish yellow pollinose, yellow haired, slightly darker and with a few brown hairs apically. Metatibiae dark yellow with short yellow hairs except for a few apical brown hairs. Halteres yellow. Basicosta bare. Wing venation normal. Wing coloration nearly hyaline except for yellow costal cell, green stigma, and small black spots at bases of basal and

anal cells, at all crossveins and on the apices of veins R_{2+3} , R_4 , R_5 , and one-third the way along M_3 . Appendix present at fork of third vein. Abdomen dorsally and ventrally with segments 1, 2 and basal part of 3 pale yellow green with short yellow hairs. The remainder brownish yellow, evenly covered with short brownish yellow hairs.

Male. Not known.

Distribution. Colombia (Choco, Valle, Cauca).

Material examined. Colombia: Holotype, ♀, Valle, Rio Zabaletas, 4km E Zabaletas, CO₂ baited flight trap, 19 Oct. 1975, R. Wilkerson coll. Paratypes (all taken at lights at night or in flight traps baited with CO₂). Valle: Bajo Calima, 3♂♂ 5 Sept. 1975; La Bocana, 1♀ 16 Aug. 1975; Rio Zabaletas, 1♀ 19 Oct. 1975; Cauca: Guapi, 2♂♂ 25 July 1975, 22♂♂ 9 Feb. 1976, 9♀♀ 10 May 1976; Choco: La Teresita, 1♀ 10 Sept. 1967.

Discussion. The paratypes range in size from 11-13mm and have frontal indices of 7.7-11.3 ($N=20$, $\bar{x}=8.9$, $SD=0.83$). Color variations are due in many cases to distribution of internal pigments. As in the other *Chlorotabanus* species, this one has green hemolymph which may or may not color parts such as antennae, legs, thorax and abdomen. As with the holotype, many of the other specimens have the last abdominal segments darker. This is due to slight external pigmental differences but also may depend on the presence of an undigested blood meal. As with *C. mexicanus* the eye color probably varies, of the two for which color was noted, one was dull brown, the other deep purple.

As its close ally *C. mexicanus*, *C. fairchildi* is evidently a crepuscular and nocturnal flier. It is difficult to distinguish the two because of a lack of good external morphological differences. *C. mexicanus* is on the whole paler, and this can especially be noted

on the mesonotum and pleura which are very light yellow green instead of straw colored or light yellow. Frontal indices are quite different, *C. mexicanus* collected in Colombia have ratios ranging from 5.3-6.7 ($N=12$, $\bar{x}=5.9$), those from all other localities range from 5.7-7.0 ($N=12$, $\bar{x}=5.9$) while *C. fairchildi*, as noted above, ranges from 7.7-11.3. The frons of *C. fairchildi* usually is more divergent above than *C. mexicanus*, 1.3-1.8 vs. 1.1-1.4 times as wide above as below. This species, *mexicanus* and the nearctic *C. crepuscularis* Bequaert are the only species with spotted wings.

Named in honor of Dr. G. B. Fairchild.

Chlorotabanus inanis (Fabricius)

Tabanus inanis Fabricius 1794, Ent. Syst., 4:368.

Chlorotabanus inanis: Fairchild 1940, Rev. Ent. 11(3):714-715, fig. 1, full references. Philip and Fairchild 1956, Ann. Ent. Soc. Amer., 49(4):316-317, fig. 1, synonymy. Goodwin and Murdoch 1974, Ann. Ent. Soc. Amer., 67(1):102, figs. 13, 25.

A medium sized yellowish brown to pale green species with hyaline unmarked wings and wholly pale haired tibiae.

Female. Length 9-14mm ($N=20$, $\bar{x}=11.8\text{mm}$). Frontal index 5.0-8.0 ($\bar{x}=6.7$). Quite similar to *C. mexicanus* (Linnaeus) and *C. fairchildi* n. sp., from which it may be distinguished by lacking spots on the wings and dark haired areas at the apices of the tibiae.

Male. As female.

Distribution. Mexico to Brazil. Colombia (Antioquia, Meta, Putumayo).

Material examined. Honduras, 1♀. Costa Rica, 2♀♀ 1♂. Panama, 20♀♀ 7♂♂. Venezuela, 2♀♀. Trinidad, 3♀♀. Guyana, 7♀♀ 3♂♂. Surinam, 3♀♀. Brazil, 25♀♀. Bolivia, 1♀. Colombia: Meta; Villavicencio, 1♀ 15 Dec. 1941; Carimagua, biting cattle, 4♀♀ 20 Nov. 1974, W. Eberhard coll.

Discussion. *C. inanis* apparently does not occur on the Pacific coast of Colombia as do *C. mexicanus* and *C. fairchildi*. Porter (pers. comm. 1976) reports it from the Providencia region of Antioquia.

Goodwin and Murdoch (1974) report finding larvae among decaying leaves in small pools of standing water.

Chlorotabanus mexicanus (Linnaeus)

Tabanus mexicanus Linnaeus 1758, Systema naturae Ed. 10. 1:602.

Chlorotabanus mexicanus: Fairchild 1940, Rev. Ent., 11(3):715-716, fig. 2, full references. Philip and Fairchild 1956, Ann. Ent. Soc. Amer., 49(4):315-316, fig. 1f., synonymy. Goodwin and Murdoch 1974, Ann. Ent. Soc. Amer., 67(1):102, fig. 13, 26, immatures.

A medium sized pale yellowish green fly with pale yellow hairs throughout, legs pale yellowish green except for darkened tips of tibiae and tarsi. Wings nearly hyaline with dark spots on all cross-veins and at the tips of at least the apical veins. Eyes greenish yellow or chocolate brown.

Female. Length 11-13mm (N=11, \bar{x} =11.7mm). Frontal index 5.3-6.7 (N=12, \bar{x} =5.9). Frons yellow pollinose, without a callus. Body and hairs light yellow or yellow green throughout. External morphology and wing markings similar to *C. fairchildi*; there are, however,

differences in frontal index and overall coloration which are discussed with the description of *C. fairchildi*.

Male. The males examined from Panama are quite similar to the females. The eye facets are well differentiated and demarcated. There are 3 distinct facet sizes; small facets on the lower fourth continuous in a narrow band along the circumocular border to the vertex; a thin strip of very small facets anteriorly above this band; and much larger facets above that, covering a half to two-thirds of central upper eye area.

Distribution. S Mexico to N Brazil, Trinidad. Colombia (Choco, Valle, Cauca, Antioquia).

Material examined. Panama, 8^{♀♀} 13♂♂. Surinam 1♀ 1♂. French Guiana, 1♀. Venezuela, 1♀. Ecuador, 1♀. Honduras, 1♀. Colombia: Valle; Rio Zabaletas, flight trap with CO₂, 1♀ 19 Oct. 1975. Cauca; Guapi, flight trap with CO₂, 11^{♀♀} 10 Oct. 1976.

Discussion. *C. mexicanus* is a crepuscular and nocturnal flier. In eastern Colombia it often flies with *C. inanis*, but the latter, however, has not been recorded from west of the Andes in Colombia. Bequaert and Renjifo (1946) list records of *C. mexicanus* from Antioquia; Murindo and Providencia; Cauca; Rio Micay; and Choco; along Atrato River, Arguia, and Andagoya. They also report it from some unspecified sites along the Magdalena River. Lee et al. (1969) captured 73 specimens (35^{♀♀} 28♂♂) at sites on the Rio Raposo (Valle), in Buenaventura, and on the Rio Micay (Cauca). Females were attracted to light traps, human bait and calves; the males to light traps. They report its occurrence all year round. It was also collected in the Choco by D. G. Young (pers. comm. 1976) and in the Providencia region

of Antioquia by C. Porter (pers. comm. 1976). Goodwin and Murdoch (1974) found larvae of this species in decaying vegetable material in small pools of standing water.

It is likely that some of the specimens reported from the west coast of Colombia as *C. mexicanus* are in fact *C. fairehildi*. Re-examination of these specimens is needed to confirm this.

Genus *Phaeotabanus* Lutz

Phaeotabanus Lutz 1913, Brasil Medico, 27(45):6. Barretto 1950, Ann. Fac. Med. Univ. S. Paulo, 25:56, full references.

Tabanus (*Phaeotabanus*): Krober 1934, Rev. Ent., 4(3):304.

The genus is characterized by a narrow frons and callus, sclerotized labella, unicolorous eyes, basal plate with obtuse dorsal angle, and usually dark wing markings.

Thirteen species are described, 3 are known to occur in Colombia, 1 in the study area.

Phaeotabanus phaeopterus Fairchild

Phaeotabanus phaeopterus Fairchild 1964, J. Med. Ent., 1(2):176, .
figs. 8, 9.

A medium sized blackish brown species with an entirely yellow orange venter and legs. Wings blackish with a hyaline tip.

Length 12-14mm (N=7, \bar{x} =13.1mm). Frontal index 6.5-8.0 (\bar{x} =7.3).
Frons convergent below, 0.6-0.8 as wide as vertex. The following is the original description of Fairchild:

♀. Length 13mm; wing 12mm. Eyes bare, bright emerald green in life, unicolorous. Frons about 7.5x as high as basal width, widened at vertex, thinly dark brown pollinose and with a slightly raised vestige of a tubercle at vertex. Frontal callus dark brown, much higher than wide, narrower than frons and extended above practically to vertex in a slender ridge, lower 2/3 of which is denuded and shiny. Subcallus, frontoclypeus and genae dark orange brown pollinose, latter with rich orange beard. Antennae orange brown, orange-haired, as figured. Palpi basally inflated, apically slenderly pointed, orange and orange-haired. Proboscis short, labella black, large and partly shiny sclerotized.

Mesonotum black, notopleural and humeral callosities, a pair of faint dorsolateral lines, sutural lines and scutellum reddish. Disk of mesonotum dark grey pollinose, sparsely black haired, as is scutellum. Sides

rich rufus orange-haired, as are pleura and sternum. Legs orange and orange-haired, except for a black-haired fringe on hind tibiae. Wings deep black, apex from tip of R_{2+3} to R_5 hyaline and a small hyaline area between apices of basal cells. There is also a lightening of color in center of discal cell. Abdomen dark orange brown, above wholly black-haired, beneath wholly orange-haired.

♂. Length 13mm; wing 11mm. Eyes bare, enlarged upper eye facets well differentiated but poorly demarcated from lower small facets, occupying about 1/3 of total eye area. Enlarged facets bronzy, small facets greenish black in life. Vertex with a small scale-like tubercle deeply sunk between eyes. Frontal triangle, frontoclypeus and genae orange and orange pollinose, as are all hairs. Antennae orange, much more slender than in ♀. Palpi inflated, porrect, with drawn-out falcate tip, all orange and orange-haired. Proboscis with theca orange, pollinose, labella black, compact, with a broad shiny sclerotized strip at base.

Whole thorax, including mesonotum and scutellum, bright orange and densely bright orange-haired. Legs wholly orange and orange-haired. Wings black, as in ♀, but somewhat dilute, especially on posterior 1/3. Abdomen as in ♀, black above, orange below, but cerci orange haired. (1964, p. 176)

Distribution. Panama to E Peru. Colombia (Choco, Antioquia, Valle).

Material examined. Peru, 1♀ (paratype). Panama, 1♀ (paratype). Colombia: Choco; between Rio San Juan and Rio Baudó, CO₂ baited flight trap, 1♀ 23 Feb. 1976; Valle; Lower Anchicaya, netted, 1♂ 2 April 1976; Rio Zabaletas, CO₂ baited flight trap, 1♀ 18 Aug. 1975; 41km E and 20km N of Buenaventura, CO₂ baited flight trap, 1♀ 22 Nov. 1975, 1♀ 5 Dec. 1975, 1♀ 19 March 1976.

Genus *Spilotabanus* Fairchild

Spilotabanus Fairchild 1969, Arq. Zool., Sao Paulo, 17(4):218.

The 2 species placed in this genus are characterized by a broad frons with an equally broad callus, an indistinct ocellar tubercle, rather slender wholly fleshy proboscis and slender palpi and antennae. Eyes are unpatterned and essentially bare. The thorax is white striped, the abdomen with brassy to golden yellow haired triangles. The wings are prominently spotted on the crossveins and at the ends of the veins.

Two species occur in the study area, one of which is new.

Key to *Spilotabanus* Species

1. Yellow hair triangles on abdominal tergites 4-6 distinct, usually nearly reaching lateral margins and often as high as segment is wide. Frons parallel sided. Wing markings not extensive, the spots seldom contiguous (Figs. 9D-F, 41)
. *triauxius* n. sp.
- 1'. Yellow hair triangles small, usually not more than half width of segment and not more than half as high as segment. Frons usually convergent above. Wing markings more extensive, many of them contiguous (Fig. 40). *multiguttatus*

Spilotabanus multiguttatus Krober
(Fig. 40)

Tabanus (*Phaeotabanus*) *multiguttatus* Krober 1930, Zool. Anz.
86:295, figs. 16-16a, ♀, Colombia.

Tabanus (*Philipotabanus*) *multiguttatus*: Bequaert and Renjifo
1946, Psyche 53(3-4):82.

Spilotabanus multiguttatus: Fairchild 1969, Arq. Zool., Sao Paulo, 17(4):218. 1971, Cat. Dipt. S. Amer. Fasc. 28:57.

Medium sized brown fly with a striped thorax, 3 small patches of yellow hairs on the abdomen, and wings with brown, sometimes coalescing spots at or near the ends of all veins and on crossveins.

Female (Neotype). Length 10mm; of wing 12mm. Frontal index 2.6. Frons slightly convergent above (0.87 times basal width). Upper half of frons grayish brown to silvery pollinose depending on the incidence of light. Ocellar area brownish with silvery pruinosity. Tubercle and vestiges of ocelli present but indistinct. Callus large, brown, drop shaped, slightly protuberant, separated from sides of frons by a thin silver pruinose border. Area to the sides of the lower half of the tapered portion of the callus a dull yellowish brown. Eyes bare, unpatterned, dull brown in life. Subcallus pale brown, yellowish brown pollinose except for silvery pollinosity to the sides and above antennal bases. Genae silver gray pollinose. Frontoclypeus pale brown with silvery pollinosity above and pale yellowish brown pollinosity below. Beard white. Antennal segments 1 and 2 yellowish brown. Third segment slightly widened with an obtuse dorsal angle, yellow brown basally, darkening to a dark brown on the annuli. Antennal hairs black. Palpi slender and flattened, slightly swollen basally, ground color brown with dark gray pollinosity. Proboscis slender, dark brown pollinose and about as long as frons height; labella wholly fleshy.

Mesonotum with area between longitudinal sutures having anterior three-fourths black covered with pale yellow pollinosity, posterior fourth dark yellowish brown. Longitudinal sutures light tan pollinose which, depending on the incidence of the light, broadens posteriorly

and nearly join at the midline. These sutures extend back and join lateral stripes of a similar color. The areas between the longitudinal sutures and the lateral stripes are black covered with pale yellow pollinosity. Vestiture mostly of long thin black hairs with a few yellow brown hairs which are most numerous posteriorly. Scutellum dark yellow brown, pale yellow pollinose. Pleura with a light brown ground color and silver gray pollinosity which is heaviest anteriorly and below. Vestiture mostly thin white hairs with a few long black hairs on the mesoanepisternum. Coxae silver gray pollinose with long white hairs. The remainder of the segments brown, the tarsi blackish brown, vestiture black. Halteres pale brownish yellow. Basicosta with setae slightly smaller and less numerous than on costa. Wings marked as figured. Pale areas tinted brown, spots brown.

Abdomen above with a brown ground color, slightly bluish gray pruinose. Tergite 2 with a small median black mark on the anterior half. Vestiture of small black hairs, most numerous on tergites 4-7. A few yellow hairs laterally on tergites 2-4. Segments 4-6 with small middorsal golden yellow hair patches. The patch on 4 is approximately one-fourth as wide and one-fourth as high as tergite. The patch on 5 is as high at the middle as that on 4 but narrower across, the patch on 6 consists of but a few hairs. Abdomen below brown with bluish gray pruinosity, clothed with numerous pale yellow hairs. Apical borders of each segment pale yellow.

Male. Not known.

Distribution. Ecuador, Peru, Colombia (Cauca, Putumayo, Magdalena).

Material examined. Colombia: Cauca; Cerro de Munchique, 2450m,

1♂ 6 Aug. 1973, 4♀♀ 7-8 Aug. 1975, all netted, R. Wilkerson coll;

Putumayo, on Amazon side of Andes along road leading to Mocoa, 2500m, 2♂♂ 13 April 1976, R. Wilkerson coll. Ecuador: Prov. Pichincha, San Juan near Quito, 3000m, 1♂ 10 Oct. 1973; Prov. Imbabura, Machetes, 1♂, L. Leon coll; Prov. Napo, Pastaza, Sta. Barbara de Sucumbios, 1♂, L. Leon coll. Peru: Hugnuco, 2800m, 1♂ Oct. 1946, Weyrauch coll.

Discussion. Krober's 1930c description of *Tabanus multiguttatus* agrees fairly well with the Cauca specimens and with the above description. Since Krober's type is presumed lost (Fairchild 1971, p. 57) and the sympatric *Sp. triaurius* is a likely cause of confusion, it seems advisable to establish a neotype for this name in the interest of stability. I have therefore labeled the specimen from Cerro de Munchique, 8 Aug. 1975, netted, R. Wilkerson coll, on which the above description is based as neotype of *Spilotabanus multiguttatus* (Krober) 1930c.

Sp. multiguttatus has an overall chocolate brown coloration; *S. triaurius* is dark blackish brown. The wing figured by Krober matches the specimen described above by having more extensive spots than *S. triaurius* and finally even though not discussed by Krober, his drawing of the frons indicates it slightly convergent above as are my specimens of *multiguttatus*.

The specimens from Munchique and Imbabura Prov. Ecuador, even though old and faded, agree with the neotype. The others from Putumayo, Napo and Pichincha provinces of Ecuador, and Huanaco, Peru, agree morphologically but have an overall darker color.

The specimens range in length from 10-12mm (\bar{x} =11.1mm). Frontal indices 2.3-3.0 (\bar{x} =2.7). The frons are from 0.8 to 1.0 times as wide above as below (\bar{x} =0.9). Although close to *S. triaurius*, *S. multiguttatus*

has more extensive wing markings (Figs. 40, 41), is brownish instead of blackish brown, and the frons is usually convergent above instead of usually parallel sided. In addition the abdominal patches of yellow hair on *S. multiguttatus* are much smaller, not nearly reaching the sides or the anterior borders of the segments as they do in *S. triaurius*. Bequaert and Renjifo (1946) report seeing a specimen from Magdalena Dept., Sierra Lorenzo, 8500 ft., H. Viereck coll, but I do not know to which species this record should be referred.

Spilotabanus triaurius n. sp.
(Figs. 9D-F, 41)

A medium sized blackish brown fly with a striped thorax, abdomen with 3 large patches of yellow hairs, and wings spotted brown on all crossveins and at or near ends of all veins.

Female. Length 12mm; of wing 13mm. Frons, palpi and antennae as figured. Frontal index 2.5, frons parallel sided. Upper half of frons above callus dull black to silver gray pollinose depending on the incidence of light. Tubercle bare but not raised, ocelli indistinct. Callus slightly raised, dark brown below, black above. Eyes essentially bare with only a few very short hairs, unpatterned dull brown in life. Subcallus, genae and frontoclypeus pale gray pollinose. Beard and the few sparse hairs on the genae and frontoclypeus pale gray. Antennae black with some pale gray pollinosity, denser on the first segment. Antennal hairs black. Palpal ground color pale brown with pale gray pollinosity on segment 1 and on all but base of segment 2, hairs black except for a few long light gray ones on underside of segment 1. Proboscis three-fourths as long as head is high, labella fleshy.

Mesonotum with area between longitudinal sutures, black on anterior three-fourths, covered with yellowish gray pollinosity; posterior fourth pale brown and pale yellow pollinose. Pollinosity along longitudinal sutures silver gray, in some lights they broaden posteriorly and nearly join at the midline. Longitudinal sutures extend back and join lateral stripes of similar color forming sublateral hook shaped marks. The areas between the longitudinal sutures and the lateral stripes are black, covered with sparse pale gray pollinosity. Vestiture mostly of long thin black hairs with a few pale yellow ones mostly along the longitudinal sutures, posteriorly at the scutellar border, and laterally just behind the head. In addition there are 2 small pale yellow hair tufts, one just above wing base, the others just behind it. Scutellum with a pale brown ground color and pale gray pollinosity on the anterior half. Pleura dark gray pollinose with long thin white hairs except for a few black hairs on the mesoanepisternum. Coxae as the pleura. Other leg segments dark brown with dark brown hairs except for a few long grayish hairs basally on the meso- and metafemora. Halteres brown, base of knob dark brown. Basicosta bare. Wing venation normal. Wings spotted dark brown on all crossveins and at or near ends of all longitudinal veins, otherwise with only a slight brown cast.

Dorsum of abdomen slightly bluish black pruinose. Vestiture of numerous short black hairs. Tergites 2 and 3 with a fringe of pale yellow hairs laterally on the apical borders and segments 4-6 with broad triangles of yellow hairs nearly reaching the sides of each segment, their apices broadly touching the apical borders of the preceding segments. Exposed portion of segment 7 with a fringe of yellow hairs.

Abdomen below black with blackish gray pollinosity and bluish black pruinosity. Apical borders slightly paler. Vestiture of medium length erect pale yellow hairs, slightly more numerous and recumbent along the apical borders. There are also a few scattered black hairs on the last few segments.

Male. Not known.

Distribution. Ecuador. Colombia (Cauca).

Material examined. Colombia: Holotype, ♀, Cauca, Cerro de Munchique, 2450m, 6 Aug. 1975, R. Wilkerson coll. Paratypes. Colombia: Cauca, Cerro de Munchique, 1044⁰⁰ 7-8 Aug. 1975; Irlanda near Toez along roadside, 1♂ 2 Jan. 1970, R. E. Dietz IV leg. Ecuador: Tungurahua, Rio Blanco, Banos, 1600 to 1900m, 1♀, Wm. C. McIntyre coll.

Discussion. The paratypes agree fairly well with the above description. The length ranges from 9-13mm (\bar{x} =10.7mm) and have frontal indices of 2.4-3.0 (\bar{x} =2.6). Width of frons at the vertex varies from 0.9 to 1.1 (\bar{x} =1.0) as wide as base. The extent of the wing spots varies slightly from the figure, but none are as extensive as *S. multiguttatus* (Fig. 40). One specimen from Munchique has light spots with heavily pigmented veins within the spots. The yellow abdominal triangles of some specimens are not as large as the holotype but some of their variation may be due to rubbing of the hairs. The triangles on the specimen from Ecuador are not as wide as the others occupying the middle half of each segment. In addition this specimen seems to be more brownish than the others but this may be due to age.

S. triaurius is very close to *S. multiguttatus*. The differences are discussed under that species.

The name refers to the 3 golden haired abdominal triangles.

Genus *Dichelacera* Macquart

Dichelacera Macquart 1838, Mem. Soc. Roy. Sci. Agric. Arts Lille, pt. 2, p. 116. Fairchild and Philip 1960, Stud. Ent. 3(1-4):1-90, pl. I-X, key, synonymy.

Members of *Dichelacera* are generally small and slender with bright body markings and a dark wing marking. The callus is usually as wide as the frons, the labella usually sclerotized, and the eyes with at least a single stripe.

Of the 70 described neotropical species 10 were found in the study area, one of which is new. Five subgenera are recognized, 4 of which are each represented by a single species in northwest Colombia.

Subgenus *Dichelacera* Macquart

Dichelacera Lutz 1915, Mem. Inst. Oswaldo Cruz, 7(1):51-119, pls. 19-21. Fairchild and Philip 1960, Studia Ent., Sao Paulo, 3(1-4):1-86.

Dichelacera is characterized by a wholly sclerotized proboscis, eyes always banded, wings with a more or less distinct dark diagonal band, and callus square and as wide as frons.

Key to Subgenus *Dichelacera* species

1. Thorax and abdomen entirely black except for narrow white haired hind marginal band on first tergite. Wings largely black. All femora black, all tibiae over half white. Frontoclypeus black, bare and shiny (Fig. 13) *melanosoma*
- 1'. Thorax and abdomen banded, yellow and black or brown. At least basal cells of wing always hyaline. Frontoclypeus always pollinose. 2

- 2(1'). First to fourth abdominal tergites with pale hind marginal bands. Fifth and following abdominal tergites without pale hairs 3
- 2'. At least fifth tergite with pale hind border or tuft or triangle of pale hairs 4
- 3(2). Proximal margin of dark fascia weakly sinuous to nearly straight, passing through fork of third vein. Fascia filling wing evenly to margin, the basal clear area strongly yellow tinged. Yellow abdominal bands on tergites 2 to 4 even or slightly wider in middle. Eyes bright green with a narrow median purple stripe and faint purple upper and lower borders (Fig. 44) *regina*
- 3'. Proximal margin of fascia as above but usually passing proximal to fork of third vein. Fascia distinct but dilute, not greatly contrasting, the basal clear area pale yellow tinged. Yellow abdominal bands on tergites 2-4 almost always wider at the middle. Eyes bright green with a single median purple stripe (Fig. 47) *chocoensis*
- 4(2'). Dark wing fascia with markedly step like inner border and a more or less prominent hyaline patch in first to third posterior cells. First tergite and narrow hind borders of third and fourth pale yellowish white haired. Second, fifth and sixth tergites usually wholly dark haired (Fig. 12)
- 4'. Proximal margin of wing fascia straight, sinuous, or step-like. First to third posterior cells without hyaline patch. First tergite and hind borders of at least second to fourth yellow haired. 5

- 5(4'). Proximal margin of wing fascia almost step like, passing through fork of third vein. Fascia usually dark and contrasting and of even intensity to wing margin, rarely with a more dilute area in first to third posterior cells. Eyes green with a broad median band and upper third purple. Abdominal yellow bands even, not over half width of segments, that on fifth tergite often reduced to a small patch (Fig. 48). . . . *submarginata*
- 5'. Proximal margin of wing fascia straight or sinuous, generally passing proximal to fork of third vein. Fascia pale, not greatly contrasting. Eyes green with a narrow purple median stripe (Fig. 49). *marginata*

Dichelacera (Dichelacera) chocoensis Fairchild and Philip
(Fig. 47)

Dichelacera chocoensis Fairchild and Philip 1960, Studia Ent.,
Sao Paulo, 3(1-4):26, pl. 2, fig. 8, pl. 8, fig. 8.

A small to medium yellow species usually with a brownish scutellum and interalar band, most examples with yellow haired bands on tergites 1-4, yellowish legs with dark metatibiae, and brown wing fascia.

Female. Length 7-11mm (N=20, \bar{x} =9.4mm). Frontal index 3.5-4.7 (\bar{x} =4.2). Frons divergent below, 1.1-1.5 (\bar{x} =1.3) times wider than vertex. The following is the original description of Fairchild and Philip.

Length 9.5mm, of wing 10mm. Eyes bare, green with a rather narrow purple transverse band (revived). Frons three times as high as basal width (2.8 to 3.3 in the series), very slightly narrowed above, dark golden yellow pollinose. Frontal callus brown, about as wide or wider than high, produced above in a short median triangular spur. Tubercle at vertex pollinose or subshiny, not prominent. Subcallus, frontoclypeus and genae pale golden yellow, beard yellow. First two antennal segments dull yellow, sparsely black-haired; third segment as long as frons, the dorsal spine slender, pointed, barely reaching

end of basal plate; annuli shorter than basal plate. Basal plate and dorsal spine dark yellow, the apical half of former dusky, style blackish. Palpi slightly inflated, orange yellow, mainly yellow-haired, but with irregularly scattered black hairs. Proboscis with theca and labella orange brown.

Mesonotum yellowish brown, pale yellowish pollinose except for a rather poorly marked dark brown pollinose interalar band and dark brown scutellum, the pale areas yellow-haired, the dark areas black-haired. Pleura and sternum yellow, pale yellow pollinose and yellow-haired. Legs mainly orange yellow, yellow-haired, but fore tarsi and hind tibiae and tarsi more brownish, dark-haired. Wing pattern as figured, the dark fascia rather dilute and brownish, the discal area tinged with yellow. Abdomen orange brown or yellowish brown in ground color, the first tergite paler. The first tergite and posterior margins of tergites 2 to 4 are sparsely yellow-haired, forming broad indistinct median triangles; remainder of abdomen sparsely dark-haired. Venter dull yellow, wholly pale-haired. (1960, p. 26)

The material examined, although generally as described above, was quite variable. Some specimens were unusually pale, the wing fascia dilute, the thorax and scutellum wholly yellow haired, and abdominal tergites 5 and 6 at least partially yellow haired. There were, however, many intermediate forms between this pale extreme and dark forms which have dark wing fascia, distinct all brown haired interalar bands and scutella, and wholly dark haired tergites 5 and 6.

Male. As described for female above. The available material consists of 2 pale, nearly all yellow specimens, and another similar to the majority of the females in coloration. Eyes bare, holoptic, the upper middle two-thirds of large facets well demarcated from the much smaller lower and bordering facets. Tubercle at vertex vertical, reaching eye level and bearing a few brown hairs. Antennae more slender than female with dorsal tooth not reaching end of basal plate. Palpi porrect, yellow and long yellow haired, about 3 times longer than wide with the tip bluntly pointed and bent slightly downward.

Distribution. Colombia (Choco, Valle, Antioquia).

Material examined. (Twelve of the following are paratypes.)

Colombia: Choco; Genene, Rio Nimiquia 3♂♂ 15 Aug. 1942, 2♀♀ 22 Aug. 1942, J. Boshell coll; Andagoya, nr. Condoto, 1♀ no date, 1♀ 27 July 1940, Otoya coll; Rio Atrato, Lloro, 1♀ 15 June 1944, S. Renjifo coll; Curiche River, 1♀ 31 July 1967, 1♀ 8 Aug. 1967, 1♀ 22 Sept. 1967, D. G. Young coll; between Rio San Juan and Rio Baudo, CO₂ baited flight trap, 52♀♀ 23 Feb. 1976; Valle; Quebrada San Joaquin nr. Buenaventura, 1♀, S. Renjifo coll; Rio Anchicaya, km 37, 1♀ 29 April 1942, S. Renjifo coll; Rio Raposo, human bait, 2♀♀ "3-12-63," 1♀ 14 Oct. 1962, C. J. Marinkelle coll; at light, 1♂ 26 Aug. 1964; 11km E and 20km N Buenaventura, CO₂ baited flight trap, 34♀♀ 22 Nov. 1975, 5♀♀ 19 March 1976; "Rio Bravo - Playa Rica," 15km below dam Lago Calima, livestock, 1♀ 3 Feb. 1976; 25km E Buenaventura, flight trap, 6♀♀ 12 Aug. 1973; Lago Calima, 8km below dam, livestock, 12♀♀ 9 April 1976; Rio Zabaletas, netted and flight trap with and without CO₂, 35♀♀ 3 June 1975, 12♀♀ July 1975, 26♀♀ 18 Aug. 1975, 3♀♀ 19 Oct. 1975; Lower Anchicaya, netted and flight trap with and without CO₂, 4♀♀ Aug. 1973, 16♀♀ Jan. 1975, 16♀♀ 10 May 1975, 2♀♀ 11 July 1975, 6♀♀ Aug. 1975, 1♀ Nov. 1975, 2♀♀ 1♂ Jan. 1976, 7♀♀ 1♂ 5 March 1976, 5♀♀ 2 May 1976; Bajo Calima, flight trap with CO₂, 10♀♀ 5 Sept. 1975; Ladrilleros, 30km N Buenaventura, netted and flight trap, 13♀♀ 23 Jan. 1975; Cauca; Guapi, CO₂ baited flight trap, 2♀♀ 10 May 1976; Rio Micay, 1♀ 25 Feb. 1943, S. Renjifo coll; Antioquia; Bagre, 1♀ 20 July 1939; Rio Anori, SW Zaragoza, 2♀♀ 19 Sept. 1970, D. G. Young coll.

Discussion. *D. chocoensis* is quite close to *D. marginata*; see that section for a discussion of their differences.

Lee et al. (1969) report capturing 157 females and 1 male at various sites on the Pacific coast near Buenaventura using human and animal bait. They were caught throughout the year but mostly in March, May, June, and Aug., all at ground level, generally in the fresh water zone.

Dichelacera (Dichelacera) fasciata Walker
(Fig. 42)

Dichelacera fasciata Walker 1850, Ins. Saunders. Dipt., 1:68.
Fairchild and Philip 1960, Stud. Ent., 3(1-4):32-33, pl. 3, fig. 9,
full references and synonymy.

A small to medium dark brown species with pale yellow and white markings above and wholly pale yellow below. Palpi long and thread-like, legs bicolored, wings with irregular step like dark fascia and abdomen with completely pale first tergite and narrow pale bands on tergites 3 and 4.

Female. Length 7.5-12.0mm (N=20, \bar{x} =9.4mm). Frontal index 3.5-4.2 (\bar{x} =3.7). Frons slightly divergent below; pale yellow pollinose, blackish toward vertex, with numerous short pale yellow and dark hairs. Ocellar tubercle quite small with indistinct vestiges of ocelli. Basal callus rectangular, produced into a narrow point above, blackish and as wide as frons. Eyes purple with two metallic green bands. Subcallus, genae, and frontoclypeus pale yellow pollinose with sparse short pale yellow hairs. Antennal segments 1 and 2 brown with dark brown hairs; segment 3 brown basally and on dorsal tooth, the remainder blackish; tooth long, reaching to the first or second annulus. Palpi narrow and threadlike; pale yellow to brownish yellow and wholly short yellow haired to nearly wholly brown haired. Proboscis rather slender, half

again as long as palpi and wholly shiny sclerotized blackish. Beard of short sparse pale yellow hairs.

Mesonotum with a broad blackish brown interalar band bordered posteriorly by a narrow pale yellow band and anteriorly by a pale yellow to brown area with 2 large dark diffuse dorsolateral spots. Scutellum blackish brown. Notal hairs blackish and pale yellow corresponding to light and dark areas. Pleura and coxae pale yellow pollinose with short concolorous hairs. Basal half of profemora and basal three-fourths of meso- and metafemora yellowish brown, the basal third of the protibiae pale, and the remainder brown to blackish brown; vestiture corresponding blackish to pale yellow. Wing with irregular step like dark fascia as figured.

Abdomen with all of tergite 1 translucent yellowish white, wholly pale haired. Tergite 2 entirely dark haired, though often its posterior half pale in ground color. Tergites 3 and 4 dark and black haired, except for narrow pale and pale yellowish white haired hind borders, the remaining tergites dark with dark hairs. Abdomen below pale yellow, pale yellow haired.

Male. Similar to female except hairs longer and the pale hairs darker yellow, nearly golden; the dorsolateral mesonotal spots indistinct. The antennae are more slender with a shorter dorsal tooth reaching only to first annulus. Palpi are porrect and about 3 times longer than wide. Eyes with large facets well differentiated and demarcated, occupying the central two-thirds of the eye surface. Eye in life with upper facets bronzy, lower dark reddish with a green stripe. Tubercle at vertex small and vertical.

Distribution. Nicaragua to Ecuador. Colombia (Choco, Valle, Cauca).

Material examined. Panama, 10♂♂, 4♂♂ (includes 1♀ compared to type of *D. fasciata* by G. B. Fairchild 1953). Costa Rica, 6♀, Nicaragua, 2♀. Colombia: Choco; between Rio San Juan and Rio Baudo, CO₂ baited flight trap and netted, 14♀ 23 Feb. 1976; Rio Nimiquia, Genene, 1♀ 15 Aug. 1942; Utria, 1♀ 27 July 1942; Alto Curiche, 2♂♂ July 1967; Curiche, 1♀ 16 March 1967, 1♂ 18 April 1967, D. G. Young coll; Valle; Rio Zabaletas, netted, flight trap, and CO₂ baited flight trap, 5♀ 3 June 1975, 17♀ 4-6 July 1975, 5♀ Aug. 1975, 13♀ 18 Aug. 1975, 10♀ 19 Sept. 1975; Bajo Calima, CO₂ baited flight trap, 36♀ 5 Sept. 1975; "Rio Bravo - Playa Rica," 15km below dam at Lago Calima, from livestock, 1♀ 19 Dec. 1975, 1♀ 17 Jan. 1976; Lower Anchicaya, netted and CO₂ baited flight trap, 5♀ 10 Aug. 1973, 2♀ 28-30 Jan. 1975, 20♀ 1♂ 10-14 May 1975, 4♀ 13 Aug. 1975, 9♀ 2♂♂ 16 Aug. 1975, 2♀ 7 Nov. 1975, 2♀ 26 Jan. 1976, 12♀ 5 March 1976, 10♀ 1♂ 2 April 1976; 12km E Buenaventura, flight trap, 1♀ 12 Aug. 1973; 41km E and 20km N Buenaventura, CO₂ baited flight trap, 11♀ 22 Nov. 1975, 5♀ 19 March 1976; Ladrilleros, 30km N Buenaventura, netted and flight trap, 5♀ 23 Jan. 1975; Rio Raposo, human bait, "3-12-63"; Cauca; Guapi, CO₂ baited flight trap, 4♀ 10 May 1976.

Discussion. Lee et al. (1969) report 56 females from Rio Raposo and around Buenaventura, all from human bait at ground level with the exception of one taken at 18m in the canopy. Bequaert and Renjifo (1946) report it (*analís* p. 66) from Valle; Puerto Merizalde, Rio Naya; and Choco; El Valle, Utria, Andagoya, and Condoto.

Dichelacera (Dichelacera) marginata Macquart
(Fig. 49)

Dichelacera marginata Macquart 1847, Dipt. Exot., Lille Mem.,
Suppl. 2:30, ♀, Cayenne. Fairchild and Philip 1960, Studia Ent.,
3(1-4):44-47, pl. 2, fig. 7, pl. 8, fig. 10, full references and
synonymy.

A small yellow species with blackish scutellum and interalar band,
yellow haired bands on tergites 1-5, yellowish legs with dark meta-
tibiae, and quite even dilute brown wing fascia.

Female. Length 7-9mm (N=21, \bar{x} =8.2mm). Frontal index 2.7-4.3
(\bar{x} =3.6). Frons divergent below, 1.2-1.5 (\bar{x} =1.3) times width at vertex.
Except for having a more distinct darker interalar band the following
description by Fairchild and Philip of a specimen from Surinam compared
to the type applies to the material examined from Colombia.

Length 11mm., of wing 10mm. Eyes bare, the pattern not
revivable, but specimens from Panama have green eyes with
a narrow transverse band, as figured by Lutz (1915).
Frons 2.9 times as high as basal width, considerably
narrowed at vertex, yellowish grey pollinose and with
yellowish hairs from callus to tubercle at vertex, the
latter surrounded by black hairs. Callus yellow brown,
as wide as frons, about as high as wide, with a very
short blunt process above. Tubercle at vertex subshiny,
not prominent. Subcallus, frontoclypeus and genae orange
yellow pollinose, beard yellow. First antennal segment
about 1.5 times as long as wide, twice as long as second
segment, both pale yellowish brown, black-haired. Third
segment as long as frons, the basal plate longer than
style. Dorsal tooth curved, pointed, not reaching end
of basal plate, tooth and basal half of basal plate
yellow orange, apical half of basal plate brownish,
style black. Palpi yellow orange, slightly inflated
basally, yellow-haired. Proboscis brown, wholly shiny
sclerotized.

Mesonotum yellowish brown, yellowish pollinose except
for a rather narrow and poorly defined dark brown
pollinose interalar band, the pale portions yellow-haired,
the dark band black-haired. Scutellum brown, black-
haired. Legs orange yellow, yellow-haired, except for

brown apices of fore tibiae, all of hind tibiae and fore and hind tarsi, which are black-haired. Wings with fascia dilute, pale brownish, its inner border well proximal to fork of third vein, the hyaline areas very slightly yellowish. Abdomen yellowish brown, the first tergite wholly yellow-haired, tergites 2 to 5 black-haired at base with a wide yellow-haired posterior band, widened slightly in the middle, remaining tergites black-haired. Venter yellowish brown, wholly pale-haired.

(1960, pp. 45-46)

Male. Readily associated with female. Eyes holoptic, the large facets occupy about two-thirds of eye area and blend gradually with the smaller facets laterally and below. Tubercle at vertex above eye level, vertical and beset with brown hairs. Palpi porrect, yellow and yellow haired, about 3 times longer than wide and bent slightly downward at tip. Antennae more slender than in female.

Distribution. Panama to N Brazil and E Peru. Colombia (Choco, Antioquia, Magdalena, Boyaca, Meta).

Material examined. Costa Rica, 1♀. Panama, 8♂♂, 24♀♀. Ecuador, 20♀♀. Venezuela, 1♀. Surinam, 3♀♀. Brazil, 2♀♀. Colombia: Choco; Curiche River, 1♀ 1 July 1967, 1♂ 1♂ 13-14 Sept. 1967, D. G. Young coll; La Teresita, 1♂ 19 Sept. 1967, D. G. Young coll; Meta; Restrepo, 500m, 2♀♀ 1936, J. Bequaert coll; Villavicencio, 450m, 1♀ 1936; Boyaca; Muzo, 900m, 1♀ 1936, J. Bequaert coll; Magdalena; Rio Don Diego, flight trap, 7♀♀ 15 Aug. 1973, Wilkerson and Young coll.

Discussion. *D. marginata* is similar to *D. chocoensis*. Refer to the key for differences.

Dichelacera (*Dichelacera*) *melanosoma* Hine
(Fig. 43)

Dichelacera melanosoma Hine 1920, Ohio J. Sci., 20(8):316, fig. 1, ♀, Costa Rica. Fairchild and Philip 1960, Studia Ent. 3(1-4):47-48, pl. 5, fig. 7, full references.

A small to medium, largely shiny blackish species without prominently banded thorax or abdomen. Legs bicolored, femora dark brown, tibiae white, and wings mostly black.

Female. Length 8-11mm (N=9, \bar{x} =9.6mm). Frontal index 2.5-3.3 (\bar{x} =2.9). Frons slightly convergent below, blackish brown in ground color with sparse silver gray pollinosity and short dark hairs. Vertex with an indistinct tubercle with vestiges of ocelli. Callus touching sides of frons, shiny blackish brown tapering at about half frons height to a fine point. Eyes in a relaxed specimen were "dark bronzy, with a single narrow transverse greenish black band" (Fairchild and Philip 1960). Subcallus and genae blackish brown with sparse silver gray pollinosity. Frontoclypeus shiny blackish brown. Antennal segments 1 and 2 pale yellow with short black hairs; segment 3 with basal portion and dorsal tooth pale yellow, the remainder brown; dorsal tooth quite long extending to at least second annulus. Proboscis a third again as long as palpi, largely sclerotized shiny blackish brown. Beard of short sparse blackish brown hairs.

Mesonotum and scutellum blackish with sparse pale gray pollinosity and short black hairs. Pleura and coxae slightly paler. Femora and protarsi blackish with dark hairs, tibiae and meso- and metatarsi whitish with concolorous hairs. Wings largely black, as figured.

Abdomen mostly shiny blackish brown with numerous short black hairs. Tergite 1 with a pale posterior margin bearing some grayish pollinosity and whitish hairs. Sternite 2 also indistinctly pale with sparse whitish hairs.

Male. The following is a brief description of a male made by Fairchild and Philip.

It is easily associated with the female, but has less white on first tergite and the fore and hind tibiae are dusky, mainly black haired. The eyes are holoptic, the large facets sharply differentiated and demarcated from the small ones, and occupying about two-thirds of the eye area. The antennae are a little paler and with a shorter and more slender dorsal spine than in the female. The palpi are black, black haired, porrect and clavate in shape. Unlike the female the entire face is thinly pollinose. (1960, p. 48)

Distribution. Costa Rica to Colombia (Choco).

Material examined. Costa Rica, 1♂, 3♀♀ (including 1 compared to type of *D. melanosoma* by C. B. Philip 1951). Panama, 2♀♀. Colombia: Choco; La Teresita, 1♀ 9 May 1967, 1♀ 6 June 1967, 1♀ 2 Sept. 1967, 1♀ 7 Sept. 1967, D. G. Young coll.

Discussion. The above description and wing figure are of specimens from Choco. As Fairchild (unpublished 1978) notes, the Colombian specimens and those from eastern Panama differ slightly from those from western Panama and Costa Rica. The eastern specimens are darker and "the hyaline area in fifth posterior cell and base of discal cell, and the hyaline outer margin of wing are noticeably narrower." Additional material may show the population from Choco and adjoining eastern Panama to be subspecifically distinct from the apparently allopatric population in extreme western Panama and Costa Rica.

Dichelacera (Dichelacera) regina Fairchild
(Fig. 44)

Dichelacera regina Fairchild 1940, Ann. Ent. Soc. Amer., 33(4): 699-700, pl. 1, fig. 3, ♀, Panama. Fairchild and Philip 1960, Studia Ent., 3(1-4):59-60, full references.

A medium sized blackish species with prominently yellow banded thorax and abdomen and wholly yellow venter, legs bicolored pale yellow

and blackish, dark wing fascia fills wing evenly to margin, and yellow abdominal bands usually on tergites 2-4 only.

Female. Length 8.5-12.0mm. The following is the original description of Fairchild.

Length 12-13mm, of wing 11-12mm. Frons about four and one half times as high as wide, parallel sided and clothed with golden yellow pollen. Frontal callus black, somewhat higher than wide and as wide as frons, with a short to medium slender prolongation above. Vertexal tubercle present, and vertex clothed with black pubescence. Subcallus, fronto-clypeus and genae clothed with whitish yellow pollen without bare callosities. Antenna long, about two-thirds length of fore-femur. First and second segments brown, clothed with black hair, third segment reddish basally, black at apex. Antennal tooth long and slender, reaching well beyond the first annulus. Annulate portion more than half the length of the basal portion. Palpi orange yellow, yellow haired, slender, and nearly as long as the proboscis. Proboscis slender, about as long as fore tarsi, the labella large, black, and shiny. Eyes bare, in life dull green with a narrow median transverse purplish band, and the upper and lower margins somewhat empurpled.

Mesonotum and pleura golden yellow, the former crossed by a velvety black band between the wing bases. The yellow area between this band and the black scutellum is about half the width of the band.

Fore coxae and femora whitish yellow, the femora brownish at apex. Tibia whitish yellow, brown at apex. Tarsi black. Mid coxae, femora, and tibiae entirely yellow, tarsi black. Hind coxae and femora, except the brown apices, yellow, tibiae and tarsi entirely black.

Wings yellow and blackish brown. Costal cell, anal cell and anal area, and a wide uninterrupted distal band dark. The distal dark area begins just beyond the stigma, and includes the major parts of all the submarginal and posterior cells, fading out to leave a narrow spur of yellow just anterior to the fifth vein (Cu +1A). The proximal margin of the dark area passes through the fork of the third vein and the apex of the discal cell. The areas not included in the above are intensely yellow hyaline.

The first abdominal tergite is whitish yellow, entirely yellow haired; the second is also yellow, but densely black haired, except the hind border, which is yellow haired. The third and fourth tergites are black and black haired, with yellow and yellow haired hind margins, while the remaining tergites are wholly black. Beneath the abdomen is clear yellow. (1940, p. 699.)

The above description matches the material examined from Colombia fairly well. My own measurements and interpretation are here added. With regard to frontal index and amount of divergence of the frons below, 2 fairly uniform geographic groups are evident. The specimens from all of Panama and 2 from La Teresita in the northern part of Choco have frontal indices of from 3.8-4.8 ($N=18$, $\bar{x}=4.3$), which agrees with the original description, and frons which are 0.8-1.25 ($\bar{x}=1.04$) as wide at the base as at the vertex. The specimens from Valle, and 1 from the southern Choco have frontal indices of from 2.7-3.9 ($N=14$, $\bar{x}=3.2$), and frons which are 1.2-1.6 ($\bar{x}=1.3$) times wider below than above.

The mesonotum of this species has a quite prominent broad blackish brown, dark haired interalar band. In front of this band is an equally broad yellow band, and posterior to it a thinner bright yellow border. The eye is mostly metallic green with a purple median band and a slightly darker green upper area. Abdominal tergite 2 is blackish brown with a broad yellow posterior border. This segment may be paler in some specimens but I have not seen any that have a totally yellow integument as stated above.

Male. The males agree with the above description fairly well. The eyes are contiguous and have a large central area of well differentiated large facets well demarcated from the small facets located on the lower quarter and in a thin band around the eye. At the vertex is a small vertical ocellar tubercle. The antennae are smaller and more slender than those of the female and the palpi correct, about 4 times longer than wide and covered with long pale yellow hairs. Abdominal tergite 2 is brown to pale brown with a paler posterior border, vestiture primarily short dark hairs with a few yellow hairs in one specimen; tergites 3 and 4 as female.

Distribution. Honduras to Ecuador. Colombia (Choco, Valle, Cauca, Antioquia).

Material examined. Honduras, 5♂♂. Panama, 16♂♂. Colombia: Choco; Upper Curiche, 1♂ 29 July 1967, 1♀ "14-11-67," D. G. Young coll; Curiche River, 1♀ 16 Oct. 1967, D. G. Young coll; between Rio San Juan and Rio Baudó, 1♀ 23 Feb. 1976; Valle; Lower Anchicaya, flight trap and CO₂ baited flight trap, 1♂ 11 June 1975, 1♂ 16 Aug. 1975, 2♀♀ 26 Jan. 1976, 2♀♀ 3-5 March 1976, 1♀ 2 April 1976; Lago Calima, 8km below dam, from livestock, 2♀♀ 4 Sept. 1975, 2♀♀ 17 Jan. 1976, 1♀ 9 May 1976; "Rio Bravo - Playa Rica," 20km below dam at Lago Calima, livestock, 1♀ 17 Jan. 1976; 41km E and 20km N Vuenaventura, CO₂ baited flight trap, 2♀♀ 19 March 1976.

Discussion. *D. regina* is quite close to *D. submarginata* Lutz. It appears that *submarginata* is found east of the Andes in Colombia and occurs with *regina* as far north as Costa Rica. *Regina* is found west of the Andes. The complete picture is not totally clear since *regina* exhibits a great deal of variation and insufficient material exists to resolve the problems. Measurements of specimens agreeing with the concept of *D. submarginata* show little variation in frontal index and amount of frontal divergence between specimens from Peru, eastern Colombia, and Panama.

In Panama *regina* has a frontal index of $\bar{x}=4.3$ and the base of the frons is $\bar{x}=1.04$ times wider than above. This is quite different from *submarginata* which has a frontal index of $\bar{x}=2.9$ and frons $\bar{x}=1.36$ times wider at base than vertex. In Colombia *regina* has a frontal index of $\bar{x}=3.2$ and frons $\bar{x}=1.3$ times wider below, thus different from the Panamanian holotype which is quite close to the above measurements of

Panamanian *regina*. The two species in Colombia can usually be separated by the criteria discussed by Fairchild and Philip (1960). Wing fascia of *submarginata* is "generally with proximal border more step-like and with usually dilute fenestre in posterior cells"; abdomen of *submarginata* usually with a yellow haired band or small yellow triangle on fifth tergite which *regina* usually does not have.

Lee et al. (1969) collected 10 females from human bait between Jan. and Aug., 1964 and 1965. One was captured at 18m in the forest canopy. Fairchild, 1953, reported 53.6% as caught in the canopy in Panama.

Bequaert and Renjifo (1946) report *regina* from: Cauca; Rio Micay; Choco; Istmina, Rio Nimiquia; and Valle; Rio Anchicaya, km 87 on road from Cali to Buenaventura, Puerto Merizalde on Rio Naya, and Veneral on Rio Yurumangui.

Dichelacera (Dichelacera) submarginata Lutz
(Fig. 48)

Dichelacera submarginata Lutz 1915, Mem. Inst. Oswaldo Cruz, 7(1):86-87, pl. 20, fig. 8, ♀, Venezuela, Peru. Fairchild and Philip 1960, Studia Ent., 3(1-4):66-67, pl. 2, fig. 9, pl. 7, fig. 3, full references and synonymy.

A small to medium blackish species with yellow bands on thorax and abdomen and wholly yellow venter, legs bicolored pale yellow and blackish, dark wing fascia usually with dilute fenestre in posterior cells, and yellow abdominal bands on tergites 2-4, tergite 5 usually with at least a yellow haired triangle.

Female. Length; Panama, 7.5-9.0mm (N=14, \bar{x} =8.5); Colombia, 8-11.5mm (N=6, \bar{x} =9.8); Peru, 7.5-11.0mm (N=13, \bar{x} =8.9). Frontal index; Panama, 2.7-3.1 (\bar{x} =2.9); Colombia, 2.5-3.0 (\bar{x} =2.7); Peru, 2.5-3.3 (\bar{x} =2.9). Divergence of frons below; Panama, 1.2-1.5 (\bar{x} =1.4); Colombia, 1.1-1.5 (\bar{x} =1.4); Peru, 1.1-1.5 (\bar{x} =1.3).

D. submarginata is quite similar to *D. regina*, except for the following differences: Wing, as figured, has the proximal border of the fascia step like and usually has dilute fenestrae in the posterior cells. In some specimens though, the fascia is of nearly uniform intensity. Abdominal tergite 5 usually has a yellow haired band or at least a small triangle. Fairchild and Philip (1960) report "The eye pattern (revived) of specimens from eastern Peru shows two broad green bands, the lower broadest. [Two Panamanian specimens] have the lower part of the eye below the dark median band entirely green, while above the median dark band there is a narrow green stripe with the remainder of the upper part of the eye purple."

Male. Agrees well with female. The eyes are contiguous and have a large central area of well differentiated and demarcated large facets. The small facets occupy the lower quarter and a thin band along posterior border of eye. Upper facets are bronze, lower facets green with a reddish stripe bordering large facets above. Of the two specimens examined, the one from Panama has tergite 2 brown and wholly dark haired, the one from Peru has a median broad yellow haired triangle; otherwise they are as in the female.

Distribution. Costa Rica to E Peru and Venezuela. Colombia (Antioquia, Meta, Cundinamarca, Santander).

Material examined. Costa Rica, 1♀. Panama, 14♀♀, 1♂. Peru, 1♂, 14♀♀ (including 1♀ compared to lectotype of *D. submarginata* by Fairchild, 1959, and 1♀ compared to holotype of *D. tricallosa* by Fairchild, 1965, with good agreement). Colombia: Antioquia, Anori River Valley, 1♀ July 1970, tree station, C. Porter leg.; Cundinamarca; Vacopi, 1♀; Santander; Gualilo, 1♀ 14 June 1942; Landazuri, 1♀ June 1942, Gast coll; Meta; Ocoa, Villavicencio, 1♀ 18 July 1939; Villavicencio, 1♀ 5 May 1942.

Discussion. *D. submarginata* is quite similar to *D. regina*. See that section for a discussion of the differences.

Subgenus *Nothocanthocera* Fairchild

Nothocanthocera Fairchild 1969, Arq. Zool., Sao Paulo, 17(4):209.

Lacks diagonal wing band, has a bare frontoclypeus and genae, partly fleshy labella, and has a wasp like appearance.

Dichelacera (*Nothocanthocera*) *albomarginata* (Krober)
(Fig. 50)

Spheciogaster albomarginatus Krober 1930, Zool. Anz., 90:76-77, figs. 17-18, ♀, Colombia, Choco, Condoto, XII-22; Fairchild 1966, Studia Ent., 9(1-4):355-356.

Dichelacera (*Nothocanthocera*) *albomarginata*: Fairchild 1971, Cat. Dipt. S. Amer., Fasc. 28:80.

A medium sized blackish brown wasp like species with a bare shiny frontoclypeus, bicolored brownish and white legs, and wings blackish except for a narrow hyaline border along posterior margin and a small hyaline patch at the apices of basal cells and adjoining costal cells.

Female. Length 12 and 15mm. Frontal indices 2.8 and 3.4. Frons 1.8 times wider below than above. Frons deep reddish brown in ground color with sparse grayish pollinosity, darker at vertex; hairs short, sparse and dark. Vertex with indistinct vestiges of a tubercle. Eye color not noted. Callus deep reddish brown, nearly touching sides of frons, narrowed gradually to a broad ridge which reaches three-fourths distance to vertex. Subcallus and genae dark brown with sparse grayish to grayish brown pollinosity. Frontoclypeus somewhat produced, shiny dark reddish brown with thin grayish pollinose lines from just above the palpi extending two-thirds the way to the genae. Antennal segments 1 and 2 pale dirty grayish brown, the hairs dark; segment 1 long, about twice length of segment 2; segment 3 with basal plate pale yellowish brown, dusky apically, dorsal tooth thin and not reaching first annulus; annuli blackish. Palpi slender, subshiny dark grayish brown with short blackish hairs. Proboscis half again as long as palpi, slender, wholly dark brown pollinose without shiny sclerotized areas; the labella compact, about the same length as the theca. Beard quite sparse, of short dark hairs.

Mesonotum and scutellum deep reddish brown in ground color with sparse bluish gray pollinosity, slightly denser along slender lines anteriorly on longitudinal sutures. Vestiture of short dark hairs. Pleura deep reddish brown with sparse bluish gray pollinosity and sparse dark hairs. Legs dark brown with dark hairs except basal half of tibiae, basal three-fourths of mesotibiae, and basal half of metatibiae which are whitish and pale haired. Basicosta bare. Wings as figured, blackish with hyaline areas along the posterior margin and in the basal cells.

Abdominal tergites 2-6 blackish brown with sparse bluish gray pollinosity and numerous short black hairs. Tergites 1 and 2 with large median dark brown pollinose and black haired triangles. These triangles are bordered by lateral blackish brown and pale haired areas with grayish pollinosity. The pollinosity is especially dense, thus forming a distinct pale border with the triangles. Abdomen below subshiny blackish with sparse grayish pollinosity denser on the posterior border of sternite 2. Vestiture of numerous short blackish hairs.

Male. Not known.

Distribution. Colombia (Choco).

Material examined. Colombia: Choco; La Teresita, 1[♂] 16 May 1967, 1[♀] 21 Nov. 1967, both D. G. Young coll.

Subgenus *Idiochelacera* Fairchild

Idiochelacera Fairchild 1969, Arq. Zool., Sao Paulo, 17(4):210.

Has a partially bare subcallus, eyes without bands, and the wings yellowish, unbanded.

Dichelacera (Idiochelacera) subcallosa Fairchild and Philip

Dichelacera subcallosa Fairchild and Philip 1960, Studia Ent., 3(1-4):83-84, pl. IV, fig. 8, Colombia, Santander Rio Suarez, ♂, ♀. Fairchild 1969, Arq. Zool. Sao Paulo, 17(4):210, 231.

A small to medium blackish brown and yellow species with median portions of the subcallus and frontoclypeus shiny, bicolored dark brown and yellowish legs, unpatterned lightly smoky brown wings, and abdomen with first two tergites contrasting yellowish translucent.

Female. Length 8-10mm (N=20, \bar{x} =9.0mm). Frontal index 3.0-4.0 (\bar{x} =3.5). Frons divergent below, 1.4-2.2 (\bar{x} =1.6) times as wide as vertex.

The description of Fairchild and Philip follows.

Length 10mm, of wing 9.5mm. Eyes bare, dark greenish black, without bands (revived). Frons three times as high as basal width, almost twice as wide at base as at vertex, greyish yellow pollinose. Frontal callus black, as wide as frons, higher than wide, protuberant, with a slender ridge extending above less than height of callus. Tubercle at vertex prominent, bare with vestiges of three ocelli. Subcallus rather swollen, brownish yellow pollinose at sides, brown, bare and shiny in the middle. Frontoclypeus rather inflated, bare and shiny in the middle and at sides to edge of tentorial pits, a strip of orange pollinosity separating the median and lateral bare areas. Genae yellowish grey pollinose, beard yellow, sparse. First antennal segment longer than wide, more than twice length of second, both orange brown, black-haired. Third segment shorter than frons, the style shorter than basal plate. Dorsal tooth rather blunt, not reaching end of basal plate. Basal plate entirely orange yellow, style dark brown. Palpi slender throughout, curved, acutely pointed, dark brown, wholly black-haired. Proboscis stout, theca shorter than the labella, dark brown, sclerotized, thinly pollinose, subshiny. Labella large, rather fleshy, with sclerotized plates at base, the remainder thinly pollinose, subshiny.

Mesonotum and scutellum blackish brown with a pair of dorsolateral pale pollinose stripes from anterior margin to slightly posterior to transverse suture, pronotal and notopleural lobes yellow, and extreme lateral and posterior margins of mesonotum paler. The mesonotum and scutellum are black-haired, the pronotal and notopleural lobes yellow-haired and there are a few yellow hairs on the pale lateral and posterior margins of mesonotum. Pleura and sternum pale yellowish grey pollinose, yellow-haired. Femora orange yellow, the fore and hind pair dusky and black-haired towards apex, mid pair entirely pale and pale-haired. Fore tibiae pale yellowish and pale-haired on basal half, blackish and black-haired distally. Mid tibiae entirely pale yellow, pale-haired throughout. Hind tibiae dark brown, wholly black-haired. Fore and hind tarsi blackish, black-haired, the mid pair paler. Wings with venation normal, no appendix on fork of third vein, pale yellowish smoky, the costal border and apex slightly darker. Abdomen with first and second segments dull yellowish in ground color, clothed sparsely with

pale hairs anteriorly, black hairs posteriorly. Remaining tergites black in ground color, wholly black-haired except for the extreme hind margins of fourth and fifth tergites which are narrowly pale and with a very narrow fringe of yellow hairs. Beneath the abdomen is wholly dull yellowish, subshiny, sparsely pale-haired.
(1960, pp. 83-84)

The only differences noted in the western Colombian material examined are a basal plate which is dark (except at its base) instead of wholly orange and the lack of sparse pale yellow hairs on the posterior border of tergite 5.

Male. Not seen by me. Fairchild and Philip describe as follows:

What we believe to be the male of this species differs very considerably in appearance. The eyes are holoptic, the area of large facets sparsely short pilose, sharply demarcated from the small facets, occupying over two-thirds of total eye area and with the facets greatly enlarged. There is a small tubercle at vertex not rising above eye level. Frontal triangle, frontoclypeus and genae yellow pollinose, with no trace of the bare callosities of the female. Antennae more slender than in female, the dorsal tooth hardly longer than breadth at base, colored as in female. Palpi porrect, pointed, yellow, yellow-haired. Proboscis more slender than in female but similar in structure. Mesonotum and scutellum wholly yellowish grey pollinose, yellow-haired. Legs patterned as in female, but paler and less contrasting. Wings as in female. Abdomen wholly bright pale orange yellow, subshiny, clothed mainly with long sparse yellow hairs, but with black hairs on at least sides of anterior parts of most tergites and mixed with yellow hairs elsewhere. (1960, p. 84)

Distribution. Colombia (Antioquia, Choco, Valle, Santander), E Peru, Ecuador.

Material examined. Peru, 1[♀]. Ecuador, 1[♀]. Colombia: Choco; between Rio San Juan and Rio Baudó, CO₂ baited flight trap, 1[♀] 23 Feb. 1976; Valle; Lower Anchicaya, netted, CO₂ baited and unbaited flight trap, 1[♀] 11 June 1975, 3^{♀♀} 16 Aug. 1975, 6^{♀♀} 5 March 1976, 15^{♀♀} 2 April 1976, 1[♀] 18 April 1976.

Discussion. C. Porter (pers. comm. 1976) captured this species in the Providencia region of Antioquia. Its distribution is noteworthy since it is found both east and west of the Andes, in Colombia, in western Ecuador (Guayas Prov.) and eastern Peru. The small differences evident between specimens from east and west of the Andes may not prove constant or significant when ample material can be studied.

Subgenus *Desmatochelacera* Fairchild

Desmatochelacera Fairchild 1969, Arq. Zool., Sao Paulo, 17(4):210.

Has a partly fleshy labella, wings with a basal and discal band, unmarked eyes, and the callus as wide as frons at the base but gradually tapering above to a point near the vertex.

Dichelacera (Desmatochelacera) transposita Walker
(Fig. 45)

Dichelacera transposita Walker 1854, List Dipt. Ins. Brit. Mus., 5:151, ♀, West Coast of America.

Catachlorops transposita: Fairchild 1940, Ann. Ent. Soc. Amer., 33(4):690, fig. 8, full references. Lee et al. Caldasia, 10(49): 448-449.

Dichelacera (Catachlorops) transposita: Bequaert and Renjifo 1946, Psyche, 53(3-4):67.

Dichelacera (Desmatochelacera) transposita: Fairchild 1971, Cat. Dipt. S. Amer., Fasc. 28, p. 65.

A small to medium blackish species with a reddish scutellum, black wings with hyaline apex and a broad hyaline band crossing the

ends of the basal cells, and abdomen with a distinct white haired triangle on tergite 4.

Female. Length 10-12.5 (N=20, \bar{x} =11.5). Frontal index 4.3-5.6 (\bar{x} =5.0). Frons nearly parallel sided although in one specimen it was narrower at the base than above and others were as much as 1.4 times wider below than at vertex. Frons sparsely dark gray pollinose with short black hairs; callus as wide as frons, blackish brown, gradually tapering above to a thin ridge which nearly reaches vertex. Ocellar tubercle indistinct, small vestiges of ocelli present. Eyes deep green in life. Subcallus, genae, and frontoclypeus silver gray pollinose. Antennal segments 1 and 2 blackish with sparse silvery pollinosity and black hairs, segment 1 about twice as long as segment 2; segment 3 dark brown, basal plate with a long dorsal tooth reaching to the first or second annulus, the four annuli about as long as the tooth. Palpi blackish gray pollinose with short shiny black hairs; palp not quite as long as frons height, recurved and bluntly pointed. Proboscis a third again as long as palpi, dark brown pollinose, without sclerotization. Beard of short grayish white hairs.

Mesonotum with dark brown ground color showing through sparse blue gray pollinosity; vestiture is of short black hairs, mostly lateral and posterior. Scutellum reddish brown and short black haired with grayish posterior border. Pleura and coxae dark brown in ground color with dense silver gray pollinosity and sparse whitish hairs. Legs blackish brown and dark haired except for the basal two-thirds of the protibiae which are white and white haired and the basal half of the mesotibiae which are pale brown. Wings black with a broad mesial hyaline band and hyaline apex as figured.

Abdomen above blackish brown with numerous short black hairs; tergites 1-4 silver gray pollinose and white haired laterally, tergites 2 and 3 with narrow posterior pale borders which widen slightly toward the midline, and tergite 4 with a distinct median equilateral pale gray pollinose and white haired triangle which nearly touches the preceeding segment in most specimens. Abdomen below blackish brown with grayish pollinosity on sternite 1 and in narrow bands which broaden slightly mesially along the posterior margins of the remainder. Vestiture of short dark hairs on dark areas and silvery white hairs on the posterior margins.

Male. Undescribed.

Distribution. Panama to Ecuador, Guyana. Colombia (Choco, Valle, Cauca, Antioquia).

Material examined. Panama, 5^{♀♀}+. Ecuador, 1[♀]. Colombia: 1[♀], terra caliente, Thieme coll; Antioquia; Rio Anori Valley, Providencia, in house, 1[♀] 18 Dec. 1969, C. H. Porter coll; Choco; between Rio San Juan and Rio Baudo, CO₂ baited flight trap and netted, 41^{♀♀} 23 Feb. 1976; Valle; Rio Zabaletas, netted, 6^{♀♀} 18 Aug. 1975; 41km E and 20km N Buenaventura, CO₂ baited flight trap, 5^{♀♀} 19 March 1976.

Discussion. Lee et al. (1969) report capturing 6 females in the Rio Raposo area (Valle) and 1 female near the Rio Micay (Cauca). All were caught at ground level coming to human bait. Capture dates were in Jan. and March at Raposo and Sept. at Micay. In addition Bequaert and Renjifo (1946) report it from Valle, Puerto Merizalde, on the Rio Naya.

Subgenus *Orthostyllocerus* Lutz

Orthostylus Lutz and Neiva 1914, Mem. Inst. Osw. Cruz, 6(2):74 (preoccupied, Becker, 1837).

The single species in this subgenus found in the study area was previously undescribed. It is not placed here with certainty but as other members of the subgenus, has a wing pattern consisting of a brown discal patch extending along costa to apex and along R₄, a narrow frons, clavate callus, sunken vertex and pale markings on tergites 3 and 4.

Dichelacera (Orthostyllocerus) aurata n. sp.
(Figs. 8G-I, 51)

A medium to large reddish brown species resembling *D. (Orthostyllocerus) ambiguus* Lutz and *Catachlorops (Psarochlorops) ecuadoriensis* Lutz in wing pattern, but differing from both in larger size, less distinct abdominal markings, fainter wing pattern and details of head structure.

Female. Length 16mm; of wing 17mm. Frontal index 4.5. Frons, palpi, and antennae as figured. Frons brown pollinose changing to grayish yellow pollinose above; hairs sparse, short, and yellowish brown. At vertex a small subshiny brown indentation, ocelli not evident. Callus shiny pale yellowish brown, not touching sides of frons, extended above in a slender ridge two-thirds distance to vertex. Eye bare, unpatterned (relaxed), color in live specimen not noted. Subcallus, genae, and frontoclypeus yellowish brown pollinose, paler, grayish below tentorial pit. Upper genae and frontoclypeus with short pale yellow hairs, the beard is of numerous short yellow hairs.

Antennal segments yellowish brown with concolorous hairs; segment 3 yellowish orange. Palpi yellowish brown with shiny pale reddish brown hairs. Proboscis about as long as palpi, wholly dark brown pollinose and fleshy except for some small sclerotized areas on the labella.

Mesonotum dark brown in ground color, paler laterally with sparse grayish yellow pollinosity above and dense yellowish pollinosity laterally; vestiture is of numerous short pale reddish yellow hairs, slightly longer laterally. Scutellum reddish brown with concolorous pollinosity and hairs as on mesonotum. Pleura and coxae pale yellowish brown pollinose above, pale grayish yellow pollinose below. Hairs longest and pale yellowish brown around wing base, shorter, sparser and pale yellow below, more numerous on procoxae. Legs wholly pale reddish brown with concolorous hairs. Halteres pale yellowish brown. Basicosta bare. Wings pale yellowish hyaline, the veins pale yellowish brown; wing markings as figured, pale brown.

Abdomen above reddish brown in ground color, the first tergite and lateral areas of second tergite slightly paler. Pollinosity sparse and grayish brown. Vestiture of numerous short shiny pale reddish yellow hairs with an indistinct denser middorsal patch of golden hairs on tergites 3 and 4. Abdomen below reddish brown with grayish yellow pollinosity and numerous short shiny yellowish brown hairs.

Male. Not known.

Distribution. Colombia (Cauca).

Material examined. Colombia: Holotype, ♀, Cauca, Cerro de Munchique, Tambo, 2400m, 9 July 1964.

Discussion. Since the genera *Dichelacera* and *Catachlorops*, with their various subgenera, are a melange of species, it is difficult

to place the above described example with certainty into any existing group.

It differs from most *Dichelacera* in not having the callus as wide as frons, the eyes are unstriped, and the labella is at most slightly sclerotized. It shares characters, however, with the subgenus *Orthostylocerus* as follows: The wing pattern with a brown discal patch extending along costa to apex and along R_4 ; a narrow frons; a clavate callus; sunken vertex; and pale markings (though not distinct) on tergites 3 and 4. It differs from *D. (O.) ambiguus* Lutz in the much longer antennal tooth and callus narrower than frons at base, as well as fainter wing pattern. Structurally it is also quite similar to *Dasychela inca* Philip, but is more slender, with yellower and paler legs and antennae and fainter wing pattern, the basal cells not darkened. *Catachlorops (Psarochlorops) ecuadoriensis* Enderlein and *C. (P.) auripilis* Philip are also very similar, differing in being much darker in legs and antennae, callus as wide as frons below and wing pattern much darker and more extensive. It may eventually be advisable to place at least the last 2 species discussed above in *Orthostyloceras* the oldest name. In any case the present species seems closest to *D. (O.) ambiguus* and is placed in the same genus, at least until relationships in this complex are better understood.

Genus *Catachlorops* Lutz

Catachlorops Lutz 1909, Inst. Osw. Cruz em Manguinhos, p. 29.
Fairchild 1940, Ann. Ent. Soc. America, 33(4):689, full references.
Barretto 1946, An. Fac. Med. Univ. S. Paulo, 22:151-183. Fairchild
1969, Arq. Zool. Sao Paulo, 17(4):210.

This genus "includes most of the small to medium species with narrow frons, clavate or ridge like frontal callus, long spined antennae, and pictured wings. Palpi are slender to threadlike, all tibiae slender, labella of proboscis rarely without sclerotized plates" (Fairchild 1969, p. 210). Four of the 6 subgenera are represented here. The subgenera are characterized in the key.

Of the 55 recognized species 4 were found in the study area. In addition 2 new species are here described.

Key to Subgenus *Amphichlorops* Species

1. Abdomen with a distinct pale yellow pollinose, golden yellow haired middorsal stripe, the remainder of the dorsum of the abdomen, except for pale lateral aspects, dark brown and brown haired (Fig. 57). *vespertina*
- 1'. Abdomen above yellowish brown and golden yellow haired, the middorsal stripe indistinct, paler. Tergites 4-6 slightly darker laterally with a few brownish hairs (Fig. 54).
. *flavissimus*

Catachlorops (*Amphichlorops*) *flavissimus* Porter
(Fig. 54)

This species is being described by C. Porter but is as yet unpublished. Porter collected it in the Providencia region of Antioquia

and I took 4⁰⁰ in Choco, between the Rio San Juan and Rio Baudó in a CO₂ baited flight trap on 23 Feb. 1976. I include it here in key only.

Catachlorops (Amphichlorops) vespertinus
(Bequaert and Renjifo-Salcedo)
(Fig. 57)

Dichelacera (Psalidia) vespertina Bequaert and Renjifo-Salcedo 1946, Psyche, 53(3-4):67-68, new name for *Tabanus elongatus* Macquart (preoccupied).

Tabanus elongatus Macquart 1846, Mem. Soc. Roy. Sci., Agr. Arts Lille, Suppl. 1, p. 166.

Rhamphidommia elongata: Kroeber 1931, Rev. Entom., 1(3):288, fig. 4.

A medium sized yellowish brown species with bicolored brown and blackish legs, yellowish brown and smoky brown wings, and abdomen with a broad middorsal yellowish stripe.

Female. Length 12-15mm (N=14, \bar{x} =13.1mm). Frontal index 3.7-4.6 (\bar{x} =4.3). Frons slightly convergent below or parallel sided. Frons yellowish brown pollinose, grayish yellow at vertex; vestiture of short pale yellow hairs. A small raised tubercle with vestiges of ocelli present at vertex. Callus subshiny reddish brown, slightly raised and narrowly club shaped tapering gradually into a threadlike, narrow ridge which reaches three-fourths the distance to the vertex. Eye color not noted. Subcallus, genae, and frontoclypeus grayish yellow. Antennal segment 1 pale yellowish brown with mostly black hairs above, yellow below; segment 2 orange yellow with dark hairs; segment 3 orange yellow, the dorsal tooth reaching to second annulus; annuli contrasting black

in some specimens the apical portion of the basal plate, and the dorsal tooth dusky. Palpi yellowish gray, slender but slightly swollen at base; vestiture of short dark hairs, some specimens with pale yellow hairs intermixed. Proboscis with theca grayish yellow pollinose, the labella subshiny blackish, one-third longer than palpi. Beard and sparse upper genal and frontoclypeal hairs pale yellow.

Mesonotum and scutellum brown to dark brown in ground color with sparse brownish to yellowish pollinosity mesially above changing to dense grayish yellow or yellow pollinosity anteriorly, laterally, and on the scutellum. Vestiture of pale yellow hairs, longer laterally and on scutellum. Pleura and coxae pale grayish yellow pollinose, yellow haired. Femora yellowish brown and pale haired; tibiae basally yellowish brown, dusky apically with generally concolorous hairs; tarsi blackish. Wings as figured mostly yellowish brown basally, smoky brown apically.

Abdomen above brown to dark brown and dark haired with a broad median pale yellowish brown, yellow haired median stripe on tergites 1-6, tapering slightly anteriorly and posteriorly. Lateral areas of all tergites pale yellowish brown and yellow haired. Below abdomen yellowish brown with numerous short yellow hairs.

Male. Undescribed.

Distribution. Bolivia, Peru, Colombia (Choco, Meta, Valle).

Material examined. Colombia: Valle; Lago Calima, 8km below dam, netted and from livestock, 2^{♂♂} 25 July 1975, 5^{♂♂} Aug. 1975, 5^{♂♂} Sept. 1975.

Discussion. Bequaert and Renjifo (1946) list the following localities in Colombia: Choco, Rio Nimiquia; Meta, Villavicencio, Restrepo; Valle, La Carmalita, Rio Frio.

Key to Subgenus *Psalidia* Species

1. Dorsal spine of third antennal segment short, seldom reaching end of basal plate. First posterior cell of wing broadly open. Black or grayish species with a white triangle on fourth tergite. Wings hyaline with an irregular blackish band beyond end of discal cell, the wing apex hyaline (Fig. 58).
. *umbratus*
- 1'. Dorsal spine longer, extending beyond end of basal plate. First posterior cell coarctate closed or petiolate. Reddish species with abdomen unmarked. Wings otherwise 2
- 2(1'). Costal, basal cells, discal cell and bases of marginal and submarginal cells yellowish to lightly smoky, a contrasting black spot at end of stigma, and fenestra in marginal and submarginal cells large and distinct. Body vestiture yellowish. Eyes generally uniformly bright green (Fig. 52)
. *fulmineus* var. *ocellatus*
- 2'. Whole wing more or less deep brown, with hyaline or subhyaline fenestra in discal cell, below stigma, and in apices of marginal and submarginal cells. Body color generally deep rufous. Eyes usually faintly bicolored, dark in upper half (Fig. 53). *fulmineus*

Catantopops (Psalidia) fulmineus (Hine)
(Figs. 52, 53)

Tabanus fulmineus Hine 1920, Ohio J. Sci., 20(60):186, ♀, Gatun, Canal Zone.

Dichelacera (Psalidia) fulminea: Fairchild 1942, Ann. Ent. Soc. Amer., 35(4):472.

Psalidia ocellata Enderlein 1925, Mitt. Zool. Mus. Berlin, 11(2): 393, ♀, Muzo, Colombia. Fairchild 1940, Ann. Ent. Soc. Amer., 33(4): 693, fig. 9, full references.

Dichelacera (Psalidia) fulminea form *ocellata*: Fairchild 1961, Rev. Biol. Trop. 9(1):27.

Tabanus festivus Hine 1920, Ohio J. Sci., 20(6):187, ♀, Gatun, Canal Zone. Dunn, 1934, Psyche, 41(3):174. Not *T. festivus* Wied. 1828.

Bellardia furcata Bigot 1892, Mem. Soc. Zool. France, 5:631, ♀, country unknown. Not *Dichelacera (Psalidia) furcata* (Wiedemann) 1828.

Form *ocellata*

A medium sized orange brown species with a narrow frons and slender palpi, legs orange brown with blackish tarsi, and wing yellowish brown basally, smoky brown apically with a contrasting dark spot at end of stigma and with adjacent hyaline spots immediately distal to it.

Female. Length 11-14mm (N=21, \bar{x} =12.9mm). Frontal index 5.5-8.2 (\bar{x} =6.5). Frons usually parallel sided or slightly divergent below, Colombian specimens 1.1-1.3 (\bar{x} =1.1) times as wide at base as at vertex, Panamanian material 0.8-1.4 (\bar{x} =1.0). Frons orange brown pollinose with short dark brown hairs. Callus shiny brownish, slender and ridge like reaching three-fourths the distance to the vertex, expanded below but not touching sides of frons. Eyes uniformly bright green. Subcallus, genae, and frontoclypeus orange brown pollinose; subcallus with a median shiny yellowish brown denuded patch. Antennal segments 1 and 2 pale yellowish orange with concolorous hairs except for a few dark

hairs on the second segment; segment 3 yellowish orange with a dorsal tooth usually extending past second annulus. Palpi slender and orange yellow with short concolorous hairs. Proboscis a third longer than palpi, theca orange yellow pollinose, labella compact shiny dark brown. Beard of short yellowish brown hairs.

Mesonotum and scutellum pale yellowish orange to reddish brown pollinose with a mixture of numerous short erect blackish hairs and recumbent yellowish hairs. Pleura and coxae orange yellow to reddish yellow pollinose with sparse concolorous hairs, more numerous below wing base and on coxae. Legs yellowish brown to yellow orange mostly pale haired. Protibiae dusky with some dark hairs apically. Tarsi blackish, meso- and metatarsi slightly paler. Wings as figured yellowish brown basally, patterned blackish brown.

Abdomen above pale orange yellow to dark reddish brown. Vestiture of short black hairs with a broad median stripe of yellowish hairs beginning as a small patch on tergite 1, expanding posteriorly into a triangle on tergite 2, and extending to tergite 5; laterally all tergites yellow haired. Abdomen below pale yellowish brown to reddish yellow and yellowish haired.

Male. As female but the specimen examined is much paler than any of the females being mostly bright yellow. Eyes holoptic, the upper three-fifths with large facets well demarcated from the small facets below. According to Fairchild (pers. comm. 1978), the 5 male specimens he has seen have either bicolored or uniformly green eyes; in the bicolored ones the upper part is darker green separated sharply from the lower lighter green area. The antennae are more slender than in the female and the palpi porrect, yellow haired and about 5 times longer than

wide. Wings are not nearly as well marked as the female but still retain the dark spot past the stigma, at the apices of cells R_1 and R_3 , and a pale cloud at the furcation. Abdomen wholly yellow haired except for a few sublateral dark hairs.

Distribution. Mexico to Colombia (Choco, Valle, Cauca, Boyaca, Antioquia)

Material examined. Mexico, 2♀♀. Guatemala, 1♀. Nicaragua, 1♀. Honduras, 6♀♀. Costa Rica, 2♀♀. Panama, 15♀♀ 1♂. Colombia: Choco; La Teresita, 1♀ 26 Sept. 1967; Upper Curiche, 1♀ 2 Sept. 1967; Valle; Rio Raposo, 2♀♀ 30 Jan. 1963, C. J. Marinkelle coll; Raposo, human bait, 1♀ 18 July 1963; Bajo Calima, 10km E Buenaventura. CO₂ baited flight trap, 1♀ 5 Sept. 1975; Cauca; Guapi, CO₂ baited flight trap, 15♀♀ 10 May 1976; Boyaca; Muzo, alt. 900m, 1♀ 1936, J. Bequaert coll (compared with type of *Psalidia ocellata* Enderlein by G. B. Fairchild, 1964 with close agreement).

Discussion. Both "forms" of this species have been captured in Colombia. I include a description of the *ocellatus* form since it has been reported from Choco but once and not at all from Valle or Cauca. Porter (pers. comm. 1976) captured both forms in the Providencia region of Antioquia. See below for a brief discussion of the nominate form.

Lee et al. (1969) captured 13 females in Feb., March, June, July, and Aug. in the Rio Raposo area. They were taken in the jungle at ground level from humans, horses, and cows.

Nominate form *fulmineus*

Female. This form is larger than *ocellatus* (13-18mm, N=9, \bar{x} =15.7mm) and reddish orange instead of orange brown or yellowish. The wings

are much more extensively dark, marked as figured, and the eye of the female has the upper third bright green with the lower part greenish purple but not very contrasting.

Male. Rufous as female but somewhat lighter. The wings also more extensively marked as are those of the female but paler smoky brown. The eyes of the 3 male *fulmineus* seen by G. B. Fairchild (pers. comm. 1978) were all bicolored as described above for some of the males of *ocellatus*.

Distribution. Honduras to Colombia (Choco, Antioquia).

Material examined. Costa Rica, 1♂. Panama, 7♀♀ 3♂♂. Colombia: Choco; Curiche River, 1♀ 19 Aug. 1967, D. G. Young coll.

Catachlorops (Psalidia) umbratus (Hine)
(Fig. 58)

Tabanus umbratus Hine 1920, Ohio J. Sci., 20(6):187, ♀, Costa Rica.

Catachlorops umbratus: Kroeber 1934, Rev. Ent. 4(2):274.

Dichelacera (Catachlorops) umbratus: Fairchild 1951, Ann. Ent. Soc. Amer., 44(3):448-450, fig. 2, Panama, full references.

Not collected in the study area of Choco, Valle, or Cauca. Porter (pers. comm. 1976) reports this species from Antioquia but I have not seen his material and it remains unpublished. As I have personally not seen Colombian material, I omit a detailed description.

Catachlorops (Catachlorops) alphas n. sp.
(Figs. 10A-C, 55)

A medium sized dark brown species with a short antennal tooth and pale yellow beard. Legs blackish except for pale basal half of

protibia, wings with a smoky brown discal band, and abdomen with a distinct large pale hair patch on tergite 4.

Female. Length 17mm; of wing 18mm. Frontal index 4.1; frons convergent below, base 0.85 as wide as vertex. Frons, antennae, and palpi as figured. Frons blackish brown in ground color, grayish yellow pollinose, vestiture rubbed but the remaining hairs short and dark or longer and pale yellow. Ocellar tubercle at vertex small with indistinct vestiges of ocelli. Denuded area above tubercle shiny blackish brown. Callus blackish brown. Eyes sparsely short haired; unpatterned metallic green in life. Subcallus pale yellowish brown pollinose. Genae and frontoclypeus mostly pale grayish yellow pollinose, slightly yellower on upper portions. Antennal segment 1 grayish brown pollinose and black haired; segment 2 yellowish brown and black haired; segment 3 yellowish orange basally and on dorsal tooth, gradually changing to brown and dark brown on annuli. Palpi dark gray pollinose and dark haired. Proboscis blackish nearly completely membranous and twice as long as palpi. Beard pale yellow, sparse hairs on upper genae and frontoclypeus pale brownish.

Mesonotum blackish brown, obscurely paler along longitudinal sutures, laterally, and middorsally. Mesonotal pollinosity brown, grayish yellow laterally; vestiture mostly rubbed but the majority of the remaining hairs are golden yellow with some blackish hairs on the darker areas above and on the notopleural lobes. Scutellum dark brown centrally and pale posteriorly with brownish pollinosity and golden yellow hairs. Pleura dark gray pollinose with pale yellow hairs, sparse except for tufts below wing base. Coxae dark gray pollinose and black haired except for pale yellow hairs on the basal half of the

procoxae. Other leg segments blackish brown with blackish hairs, except that the basal half of the protibia is pale yellow and pale haired. Halteres yellowish brown, the knob paler. Basicosta with approximately 12 small setae. Wing as figured, the pattern dark brown.

Abdomen above blackish brown with numerous short black hairs, tergites 1 and 2 slightly paler. Lateral areas of tergites 1 and 2 with broad areas of pale yellow hairs, tergite 3 with a few pale hairs. Tergite 4 with a large middorsal grayish yellow pollinose and pale yellow-haired triangular patch which does not reach to sides of the tergite but extends its full length. Abdomen below blackish brown with diffuse pale grayish pollinosity on the borders of sternites 2-4 which expand anteriorly to nearly reach preceding segments. Vestiture of short black hairs with pale yellow hairs on pale areas.

Male. Not known.

Distribution. Colombia (Valle).

Material examined. Colombia: Holotype, Valle, 3.6km W Queremal, 1130m, attracted to man, 14 Feb. 1976, R. Wilkerson coll.

Discussion. *C. alphus* is similar to *C. (Catachlorops) caloptera* (Schiner). *Caloptera* differs by having a much thicker basal plate with a long recurved dorsal tooth and pseudoannulations, and beard and pleural hairs white.

Considering the few specimens available of these two species it is possible they are conspecific and represent only normal variation. Only with more material will it be possible to resolve this question.

The name meaning "white spot on the skin" refers to the large middorsal pale spot.

Catachlorops (Psarochlorops) siculus n. sp.
(Figs. 9J-L, 56)

A medium sized brownish species, pale yellow below, legs brownish, dusky apically; wings with large diffuse clouds on apex of discal cell and fork of third vein, and abdomen with pale median contiguous triangles on tergites 2-4.

Female. Length 13mm; of wing 14mm. Frontal index 5.0. Frons, palpi, and antennae as figured. Frons grayish yellow pollinose, darker above with short yellow hairs below and short black hairs at vertex, without tubercle or vestiges of ocelli. Callus shiny brown not touching sides of frons. Eye (relaxed) blackish green, unpatterned. Subcallus, genae, and frontoclypeus yellowish pollinose, beard of short yellow hairs. Antennal segments 1 and 2 yellowish brown and black haired; segment 3 with basal plate and dorsal tooth reddish brown, dusky apically with blackish brown annuli. Palpi dirty yellowish brown, mostly black haired, but with a few yellowish hairs intermixed. Proboscis slender, blackish brown pollinose without shiny sclerotized areas. Labella compact, not quite as long as theca.

Mesonotum brown pollinose, paler anteriorly and laterally; vestiture of sparse short black hairs, longer and more numerous on notopleural lobe, and with a few short golden hairs interspersed, most numerous at the scutellar border and posterolaterally. Pleura and coxae grayish yellow pollinose with short yellow hairs, denser and yellowish brown around wing base. Profemora yellowish brown, yellow haired ventrally, dark haired apically and dorsally. Meso- and metafemora yellowish brown and wholly yellow haired. Pro- and mesotarsi grayish brown, dusky apically with some short golden hairs basally, the remainder

dark haired. Metatibiae and metatarsi similar but slightly paler and uniform in color. Protibia about as in profemora, not obviously bi-colored, but slightly paler basally. Pro- and mesotarsi blackish brown. Halteres yellowish brown, base of knob dusky. Basicosta bare. Wings smoky yellowish, as figured, the clouds at apex of discal cell and fork of third vein brown, costal cell yellow, darker than adjoining wing.

Abdomen above yellowish brown, becoming dark brown on last few segments. Vestiture of numerous short black hairs, denser and longer on last segments. Tergites 2-4 with middorsal narrow yellow pollinose golden yellow haired triangles, each touching the preceeding segment. The broadest triangle is on tergite 4, the narrowest on tergite 2. Tergite 1 has a small middorsal pale yellow pollinose, yellow haired patch, and tergite 5 a similar indistinct small triangular patch. Abdominal venter and extreme sides of all tergites yellow pollinose and golden yellow haired.

Male. Not known.

Distribution. Colombia (Valle).

Material examined. Colombia: Holotype, ♀, Valle, Lago Calima, 8km below dam, 1250m, from bait horse, 19 Sept. 1975, R. Wilkerson coll; Paratypes, Valle; Lago Calima, 8km below dam, 1250m, netted when attracted to man and from livestock, 1♀ 25 July 1975, 1♀ 8 Aug. 1975, 1♀ 12 Aug. 1975, 2♀♀ 22 Aug. 1975, 3♀♀ 4 Sept. 1975, 1♀ 19 Sept. 1975, 1♀ 26 March 1976; 3.6km W. Queremal, 1130m, netted, 1♀ 12 Feb. 1976; Rio Digua, 2♀♀ June 1970, W. Eberhard coll.

Discussion. *C. (Psarochlorops) siculus* is close to *C. (P.) ecuadoriensis* Enderlein and *C. (P.) testaceus* Macquart, being closest

to the former in color of body and appendages, both dark, but with the wings like *testaceus*, the fascia broken into 2 nearly separate patches. From *testaceus* it differs in dark brown legs, antennae and callus (yellow in *testaceus*) and in lacking the bicolored protibiae of that species.

The name refers to the dagger-like middorsal markings.

Genus *Dasychela* Enderlein

Dasychela Enderlein 1922, Mitt. Zool. Mus. Berlin, 10(2):345.

Fairchild 1969, Arq. Zool. Sao Paulo, 17(4):212.

Subgenus *Dasychela* Enderlein

Dasychela is characterized by long slender palpi and proboscides, the labella compact but unsclerotized. The frons is of medium to narrow width with a ridge like to clavate callus. Basal plate of the antennae is quite long with a very long dorsal tooth. The wings are patterned with a discal band and basal infuscation with the apices of the basal cells and the apex of the wing hyaline.

Of the 5 described species 3 occur in Colombia and 1 in the study area.

Dasychela ocellus (Walker)

Pangonia ocellus Walker 1848, ♀, Ecuador, Quito.

Stypochela ocellus: Fairchild 1958, Ann. Ent. Soc. Amer. 51(6):520, fig. 16, references and synonymy.

Dasychela ocellus: Fairchild 1958, Smiths. Misc. Col., 131(3):24.

A large dark brown species with a long slender proboscis, hairy eyes, very long dorsal antennal spine, threadlike palpi, dark brown legs, wings patterned with irregular brown basal and discal bands, and abdomen unmarked dark reddish brown.

Female. Length 16-18mm (N=20, \bar{x} =16.9mm). Frontal index 2.7-4.1 (\bar{x} =3.5). Frons dark yellowish brown pollinose, with numerous slender brown hairs slightly divergent below. A small shiny reddish brown tubercle with indistinct vestiges of ocelli present at vertex. Callus

swollen reddish brown, about half as wide as frons at base, tapering to a fine pointed ridge above. Eyes with numerous short hairs, color not noted. Subcallus, genae, and frontoclypeus dark yellowish brown, the beard of numerous dark brown hairs. Antennae reddish brown, segments 1 and 2 with a mixture of short black and brown hairs. Basal plate and dorsal spine both quite elongated, the tooth nearly reaching the last annulus. Palpi threadlike, dark grayish brown with many short black hairs. Proboscis wholly dark brown pollinose, quite slender and long, 6-15mm (\bar{x} =7.8).

Mesonotum and scutellum reddish brown covered with brown pollinosity and many slender black hairs, a few reddish brown hairs laterally, along the posterior margins of the mesonotum and scutellum. Pleura grayish brown pollinose with numerous slender brown hairs except for reddish yellow hairs below wing base. Procoxae yellowish brown pollinose with long brown and reddish yellow hairs. Mesocoxae as pleura. Metacoxae reddish brown, gray pollinose. Femora reddish brown, tibiae and tarsi paler. Wing with irregular brown basal and discal bands.

Abdomen above dark reddish brown, nearly blackish on the last segments, with sparse dark gray pollinosity, vestiture short black hairs, quite numerous on the last segments. Abdomen below subshiny black with sparse gray pollinosity and black hairs.

Male. Not known.

Distribution. Peru, Ecuador, Colombia (Valle, Meta).

Material examined. Ecuador, 1 σ^0 . Colombia: Meta; Villavicencio, 1 σ^0 19 Dec.; Valle; Lago Calima, 8-20km below dam at Lago Calima, ex. livestock, one from a flight trap, 1 σ^0 24 Nov. 1974, 1 σ^0 8 Aug. 1975, 7 σ^0 7 σ^0 Sept. 1975, 2 σ^0 2 σ^0 Oct. 1975, 10 σ^0 10 σ^0 19 Dec. 1975, 19 σ^0 19 σ^0 Jan. 1976, 1 σ^0 1 σ^0 3 Feb. 1976.

Discussion. The description and figures of the type (Fairchild 1958) agree well with the above description. Fairchild states he saw specimens in addition to the type from Ecuador and Peru.

Genus *Dioladocera* Lutz

Dioladocera Lutz 1913, Brazil Medico, 27(45):5. Fairchild 1969, Arq. Zool. Sao Paulo, 17(4):217.

The genus *Dioladocera* is characterized by generally having a long dorsal antennal spine, unsclerotized labella, basicosta with at least a few setae, often hairy eyes, and in many a characteristic wing pattern of a discal band with clear discal cell.

Most are Andean species with a center of distribution from Colombia to Peru. Including the 8 new species described here, there are 34 named members. A total of 16 species occur in the study area.

Key to *Dioladocera* species

1. Antennae with basal plate yellow or orange to brown 2
- 1'. Antennae all black, at most the basal plate brown 4
- 2(1). Antennae entirely bright yellow, at most the terminal 2 or 3 annuli dusky. Antennal tooth short, little more than an acute angle. Wings essentially patternless, yellowish hyaline with a faint shade below stigma. Abdomen black with hind margin of tergite 4 broadly brassy haired *clarus*
- 2'. Antennae clearly to obscurely bicolored. Wing with strong black pattern and fenestrate discal cell. 3
- 3(2'). Basal plate yellow, strongly contrasting with black style. Antennal tooth acute, failing to reach first annulus of style. Haltere knob white, Frontoclypeus partly bare (Figs. 12D-F, 71) *pruinosa* n. sp.
- 3'. Basal plate dull orange to dark brown, the style black. Antennal tooth long, acute, arched, reaching to or beyond

- first annulus. Frontoclypeus pollinose, at most with a small median bare spot. Haltere knob orange to brown (Figs. 11E-G, 72) *calimaensis* n. sp.
- 4(1'). Legs bicolored, at least the protibiae paler than profemora. . . 5
- 4'. Legs black to dark brown, the tibiae not markedly paler than femora. 9
- 5(4). Wings with strong and definite dark pattern which leaves clear fenestrae in discal cell, ends of basal cells and whitish patches in bases of most or all marginal cells. 6
- 5'. Wings with faint indefinite dark pattern consisting of dark borders of veins, overall tinting, or discrete clouds on crossveins. 7
- 6(5). Beard pale to dark brown. Tibiae largely orange, with golden hairs. Abdomen nearly black, with small golden haired equilateral triangles on tergites 4-6 and small pale hair tufts laterally on sternites 2-5 (Figs. 13A-C, 68). *minos*
- 6'. Beard white, rarely grayish. Tibiae dark reddish, black-haired, the fore pair often with sparse white hairs basally. Abdomen chocolate brown to nearly black, with a large sparsely white haired equilateral triangle on tergite 4, and all sternites narrowly white haired behind (Figs. 10F-J, 69). *argentomacula* n. sp.
- 7(5'). Abdomen reddish brown in ground color. Scutellum broadly red behind. Tibiae yellow to red, the femora usually contrastingly darker, at least the fore and hind pair black at base. Wings yellowish tinted, with small clear to faint darker clouds around all crossveins and fork of third vein.

- 7'. Abdomen black in ground color, with prominent pale hair patches on at least tergites 4-6. Wings without discrete clouds on crossveins and fork. Antennal tooth shorter, usually failing to reach first annulus. 8
- 8(7'). Beard white or slightly yellowish tinged. Body hairs mostly black, the pale shining hairs on dorsum of abdomen silvery to pale brassy, forming nearly equilateral triangles on tergites 4-6 (Figs. 11II-J, 62) *hirsuta* n. sp.
- 8'. Beard orange. Body hairs largely coppery red, the pale shining hairs on dorsum of abdomen brassy to golden, forming broad low triangles, sometimes as wide as segment and often present on third or even second segments as well as 4-6 (Figs. 11A-D, 74) *leei* n. sp.
- 9(4'). Beard silvery white, rarely faintly grayish. 10
- 9'. Beard yellow, orange, brown or black. 11
- 10(9). Wing pattern intensely black and clear cut, with a prominent round clear fenestra in discal cell. Abdomen shiny black, above with a small subtriangular or transversely oval patch of creamy white hairs on tergite 4; beneath with prominent white hair patches laterally on at least segments 3-5 (Fig. 73) *nigrocoerulea*
- 10'. Wing pattern dilute and diffuse, consisting of undemarcated darkening of membrane, more intense adjacent to veins, but without a clear round fenestra in discal cell. Dorsal abdominal hair patch silvery white and ventrolateral patches indicated by a few pale hairs (Figs. 12A-C, 61) *beaveri* n. sp.

- 11(9'). Beard dark brown to black. Wing pattern strongly defined,
the dark portions intensely pigmented 12
- 11'. Beard orange to pale yellowish brown, sometimes nearly white.
. 13
12. Large stout species resembling *nigrocoerulea*, but palpi and
beard black, antennae more slender, frons narrower, and a
small pale hair tuft on tergite 5 (Fig. 60) *riveti*
- 12'. Smaller more slender dark brown species, the antennal tooth
not reaching first annulus, the wing pattern dark but some-
what diffuse, the abdomen above with a broad white-haired
triangle on tergite 4 and scattered white hairs on hind border
of tergite 3. Beneath segments 2-4 have complete white
haired margins (Figs. 12G-I, 59). *dalesandroi* n. sp.
- 13(11'). Wings without dark pattern, rather evenly yellowish brown,
rarely with faint clouds on crossveins and fork of third
vein. Abdomen reddish brown to nearly black, usually with a
small black median streak on tergite 2, and with a small
easily lost tuft of yellowish shiny hairs on tergite 4. Beard
pale gray to pale brown. Antennal tooth short and erect
(Fig. 70) *rubiginipennis*
- 13'. Wings with a dark pattern. Abdomen shiny black with median
pale hair patch on tergite 4, rarely on 5 and often absent
in rubbed specimens. Antennal tooth long and arched, usually
reaching or exceeding first annulus 14
14. Wing orange brown basally to ends of basal cells, darker
brown thence to apex, the centers of all cells paler (Figs.
12J-L, 63, 64). *distomacula* n. sp.

- 14'. Wings with typical *Dieladoocera* pattern more or less evident,
at least the wing distal to fork clearly paler. 15
- 15(14'). Scutellum usually shiny red in ground color, contrasting with
abdomen. Wing pattern rather diffuse and indefinite, in
some specimens expressed only as a darkening of basal two-
thirds of wing. All beard and pleural hairs deep orange
(Fig. 65) *macula*
- 15'. Scutellum shiny black, like abdomen. Wing pattern more clear
cut, the costal and basal cells largely yellow, contrasting
with blackish discal band. Beard and pleural hairs pale orange
yellow; a tuft of white hairs before wing bases (Fig. 66) . . .
. *submacula*

Dieladoocera argentomacula n. sp.
(Figs. 10F-J, 69)

Dieladoocera neosubmacula: Fairchild 1967, Studia Entomologica,
Sao Paulo, 9(1-4):343.

A medium sized brown species with a pale gray beard and pleura,
striped thorax, black femora and reddish brown tibiae and tarsi,
patterned brown wings and a broad median pale triangle on abdominal
tergite 4.

Female. Length 16mm; of wing 15mm. Eyes sparsely short haired;
no pattern noted. Frons, antennae and palpi as figured. Frontal
index 3.4. Frons moderately swollen, silver white pollinose, upper
half grayish white with some yellow pollinosity toward the middle
visible when the light angle is changed. Upper half including vertex
with a few erect short black hairs. Ocellar area raised, shiny dark
brown except for sparse grayish pollinosity at the vertex. Ocellar

tubercle present, ocelli not distinct. Subcallus, frontoclypeus and genae silver gray pollinose except for some yellowish pollinosity at antennal bases. First two antennal segments black, gray pollinose; the third dark brown, yellowish gray pollinose. Antennal hairs black. Palpi black, gray pollinose. Proboscis short, one-third longer than palpi; labella fleshy. Beard and hairs on frontoclypeus white, of moderate length and density.

Mesonotal ground color brown. Mesonotum striped with alternating brown and grayish brown pollinose areas. Vestiture is of sparse dark and light hairs corresponding to the stripes; the margins of mesonotum have denser, longer mostly white hairs except for tufts of black along wing bases and on notopleural lobes. Scutellum dark brown basally, lighter apically, light gray pollinose; hairs sparse, black mesially, white laterally. Pleura gray pollinose, white haired. Coxae silver gray pollinose; procoxae have long white hairs; meso- and metacoxae have shorter sparser white hairs. Femora black, gray pollinose. Profemora evenly covered with short erect black hairs, the meso- and metafemora have a mixture of short black and white erect hairs, the black predominating dorsally and apically. Tibiae brown, slightly darker apically. Hairs mostly short, recumbent and dark except for a small patch of light hairs on the dorsal bases of the protibiae. Tarsi dark brown, covered with short dark hairs. Halteres brown, tip of knob yellow. Basicosta bare. Wings patterned brownish, as figured.

Abdomen brown above, gray pollinose laterally on tergites 1 and 2 and with a faint gray triangle on tergite 4. Vestiture is of recumbent short black hairs, heavier at midline of tergite 1 and basally on other segments. In addition there is the remnant of a broad triangle

of white hairs on tergites 4 and 5, small tufts of white hairs apically on lateral margins of tergites 1, 2, 3, and 4, hairs most numerous on 3 and 4. Venter of abdomen is dark gray pollinose except apical borders of sternites, which are white. Venter hairs longer than those on dorsum, mostly white, but with a few black hairs; white hairs predominate on the apical borders of each segment.

Male. Length 15mm; of wing 13mm. The male from Lago Calima is overall quite similar morphologically to the females described here but is in rather poor condition due to overexposure to cyanide. The overall color is reddish brown with pale yellowish vestiture. Antennae and palpi as figured. Eye facets well differentiated and demarcated, the smaller facets occupying the bottom fourth and continuing around in thin bands behind which meet at the vertex. Eyes with a moderate number of short hairs among the large facets. Subcallus yellowish brown pollinose, genae and frontoclypeus yellowish gray. Antennae reddish brown, black haired. Palpi light reddish brown, light yellowish brown pollinose; first segment light yellow haired, the second brown haired. Proboscis slender, about two-thirds as high as head; labella fleshy. The remainder of the specimen is as the female but reddish brown and faded. The middorsal pale abdominal triangle of the female is not evident but may have been rubbed off.

Distribution. Colombia (Valle), Ecuador, Peru.

Material examined. Colombia: Holotype, ♀, Valle, Penas Blancas, 10km W Cali, horse bait, 3 Sept. 1975, R. Wilkerson coll. Paratypes; Colombia: Valle; Penas Blancas, from bait horse, 7♀♀ 2-12 Aug. 1975 5♀♀ July 1975, 7♀♀ Aug. 1975; Anchicaya, 1♂ 5 March 1976; Lago Calima, 1♂ 25 July 1975, 3♀♀ 22 Aug. 1975; Tres Esquinas, Habana, Buga, 1♀

21 July 1942, S. Renjifo coll. Peru: Huanuco; Cochicote, 1♀ 4 Sept. 1965, J. C. Hitchcock, Jr. coll; Cuzco; Quincemil, 740m, 3♀♀ 27-31 Aug. 1962, L. Pena coll. Ecuador: San Francisco, Rio Pastaza, 1200m 1♀ 14 Oct. 1937, (and another label Banos, 1600-1900m, Tungurahua), Wm. C. MacIntyre coll; 1♀ Abitagua, Rio Pastaza, 1200m, Oreinte, Wm. C. MacIntyre coll; 1♀ Santa Inez, R. Haensch coll.

Discussion. The paratypes range in length from 12-15mm (\bar{x} =13.2mm) and have frontal indices of from 3.1 to 4.3 (\bar{x} =3.6, 1SD=0.5). All Colombian material agrees fairly well with the above description, varying in intensity of overall coloration from brown to blackish brown. Wing pigmentation varies, from less to more extensive than holotype. Three specimens including the male are much lighter and have yellowish hairs but I believe these to have been exposed to cyanide too long.

The three specimens from Ecuador are all paler (and apparently older), have shorter dorsal antennal teeth, and have light reddish brown palpi with grayish pollinosity and a mixture of black and white hairs. Four specimens from Peru differ in the following manner: The fronts are narrower (frontal indices 4.1-4.3) than any of the other specimens; there is little coloration on the veins of the posterior margin while all but one of the Colombian examples, from Lago Calima, has pigmentation on all or part of these veins; and the palpi of the Peruvian specimens are brownish with gray pollinosity with white hairs on the basal two-thirds and white and black hairs apically.

Two Colombian specimens were caught during biting captures from a horse, one on 12 Aug. 1975 at 1240hrs biting the haunch; temperature 28°C, RH 66% with the sun shining, and the other, 10 July 1975 at 1030hrs, biting the hind hock, cloudy conditions; temperature 28.5°C, RH 77%.

Dicladocera (Dasyrhamphis) neosubmacula Krober 1931 seems to have been proposed as a new name for *Tabanus submacula* Walker 1850, thought by Krober to be in part a synonym of *T. macula* Macquart 1845. It is doubtful if Krober saw the types of either species, though they are listed as synonymous in his 1934 catalogue. Krober based his *neosubmacula* on a ♂ said by Austen to agree with Walker's type, and a ♀ thought by Krober to be the same species. According to Fairchild (1956) *macula* and *submacula* are distinct species as represented by their types in BM(NH), while the specimens on which Krober based his name, supposed to be in Berlin-Dahlem, cannot now be found (Fairchild 1967). Specimens determined by Krober as *neosubmacula* in various museums (Fairchild 1967, 1975) agree with the material here described, but not with Krober's description. As Fairchild suggested (1967) the name had best be left unused until the types can be studied, though it is probable that *neosubmacula* was a variant of the present species.

Dicladocera basirufa (Walker)
(Figs. 10D-E, 67)

Tabanus basi-rufus Walker 1850, Insecta Saundersiana, Diptera, 1:32.

Dicladocera steinheili Enderlein 1925, Mitt. Zool. Mus. Berlin, 11(2):384. Fairchild 1966, Jour. Med. Ent. 3(1):5.

Dicladocera basirufa: Krober 1940, Verhoff. Deutsche Kol. Mus. Bremen 3(1):69. Fairchild 1971, Cat. S. Amer. Dipt., 28, p. 73.

A medium to large dark brown species with light yellow beard and pleura, apices of femora, tibiae, and tarsi pale, wings with brownish infuscation mostly on crossveins, and a small patch of yellow hairs on abdominal tergite 4.

Eyes pilose, covered with many medium length reddish hairs; facets well differentiated and demarcated, the smaller ones covering the bottom third of the eye.

Female. Quite similar to male (see below). Length 14-16mm. Frontal indices 2.0-3.5 (N=4, \bar{x} =3.3). Frons pale yellow pollinose, subshiny brown at vertex; vestiture of medium length dark brown hairs. Callus light brown, small, drop-shaped, expanded somewhat basally. Antennae as in male but dorsal tooth longer and slightly recurved, reaching to first annulus. Palpi stout, light yellowish brown pollinose with many short black hairs.

Thorax, legs and wings as in male.

Abdomen reddish brown above with many short black hairs; segment 5 with a few pale hairs on the midposterior margin. Below, abdomen reddish brown, light yellow pollinose with short black hairs.

Male. (Previously undescribed.) Length 17mm; of wing 16mm. Antennae and palpi as figured. Subcallus frontoclypeus and genae yellow pollinose. First and second antennal segments brown with black hairs; third segment black with light yellow pollinosity and a brown area at base of basal plate; third segment missing on left side. Palpi porrect; first palpal segment light brown, yellow haired; second yellow with light brown hairs. Probsocis short, wholly sclerotized. Beard of moderately dense long yellow hairs.

Mesonotum black and brown in ground color, with light yellow pollinosity; the two lateral black areas run the length of the mesonotum and a wide median black area reaches three-fourths of the way to the scutellum; vestiture of short sparse yellow and black hairs. Scutellum brown to dark brown, yellow pollinose with a few dark hairs.

Pleura gray pollinose covered with long dense yellow hairs with a few black hairs interspersed. Coxae gray pollinose; procoxae covered with long yellow hairs, others with sparse black and yellow hairs. Femora dark brown basally, paler apically, gray pollinose, covered with sparse black and yellow hairs. Tibiae light brown, yellow and black haired, the yellow hairs predominating. Tarsi light brown with many short black and brownish hairs. Basicosta pointed, partially covered with a cluster of about 20 small setae. Halteres yellow. Wings tinted brownish.

Abdominal integument reddish brown dorsally with small median dark areas on tergite 1 covered with black hairs; remainder of vestiture mostly limited to a few black hairs at the segment margins. Abdomen brown below with light yellow pollinosity except for gray pollinosity on the median half of sternite 1. Sternites 1 and 2 slightly darker mesially; vestiture of sparse black hairs, most numerous on middle of segment 2.

Distribution. Colombia (Cundinamarca, Cauca, Huila, Narino). Ecuador.

Material examined. Ecuador, 1[♀] (compared to types of both *Tabanus basi-rufus* and *D. steinheili* by G. B. Fairchild. Colombia: Cundinamarca; near Guasca, 3500m, 1[♀] 3 Jan. 1959, J. F. Clarke coll; ?Cauca or Huila; Paramo de las Papas, 3100-3500m, sources of Rio Magdalena, 2^{♀♀}; Narino; near Pasto, 1[♂] 22 Dec. 1974, A. Gomez coll.

Discussion. This species is found only at high elevations generally in or near paramo vegetation.

The 3^{♀♀} specimens examined all agree with the homotype. The [♂] and the [♀] from Cundinamarca are more lightly tinted along vein margins.

Dicladocera beaveri n. sp.
(Figs. 12A-C, 61)

A medium sized shiny black fly with smoky black wings, a white beard, unicolorous black legs and a small white hair patch on abdominal tergite 4.

Female. Length 15mm; of wing 15mm. Frons, antennae and palpi as figured. Frontal index 3.5. Frons swollen, dull black or light gray depending on the incidence of the light. Tubercle at vertex indistinct and shiny, the ocellar area less pollinose than rest of frons. Frontal hairs black, rather sparse but quite long and more numerous toward the vertex. Callus shiny black. Eyes with short sparse hairs, uniform bright green in life. Subcallus light yellow pollinose. Frontoclypeus and genae black, silver gray pollinose. Beard white, moderately long; the hairs shorter and sparser on the upper genae and frontoclypeus. Antennal ground color black with some gray pollinosity on the first segment and some yellow pollinosity on the second and third segments. Antennal hairs black. Palpi black, gray pollinose, black haired. Proboscis short, labella fleshy.

Mesonotum black, dark brown posteriorly, covered with sparse light gray pollinosity. Light colored pollinosity evident anteriorly along longitudinal sutures and less distinctly laterally above pleural areas. Mesonotal hairs thin and black, longer and more numerous on notopleural lobes and laterally along scutellar border. Notopleural suture with a few white hairs. Scutellum mostly brown with a central black area, clothed with a few small black hairs. Pleura black, gray pollinose. Pleural hairs fairly long, black except for a small white tuft at the wing base. Halteres with a brown knob and a yellowish

brown stem. Coxae black, silver gray pollinose. Procoxae with long white hairs basally, black haired apically; meso- and metacoxae with sparse black hairs. Femora black with a few medium length black hairs. Tibiae and tarsi black with many short black hairs. Basicosta with about 20 short to medium length slender black setae. Wings with a blackish brown cast. Vein margins pigmented, more heavily on basal half of wing but without clearly defined pattern.

Abdomen shiny black dorsally, vestiture of short black hairs most of which are found on lateral aspects of all but the last few segments. Segments 1 and 2 have small white lateral hair tufts; on the middorsal posterior border of tergite 4 is a small but prominent white hair patch. Ventrally the abdomen is shiny black with a few short black hairs mostly along the posterior margins although laterally on segments 3 and 4 there are a few white hairs.

Male. Not known.

Distribution. Colombia (Cauca).

Material examined. Colombia: Holotype, ♀, Cauca, Cerro de Munchique, 2450m, 8 Aug. 1975, R. Wilkerson coll.

Discussion. This species is very close to *D. nigrocoerulea* (Rondani). *D. beaveri* has unpatterned wings, infuscated throughout, but basally darker (Fig. 61). It is also smaller (14mm) and has black palpal hairs. *D. nigrocoerulea* has patterned wings (Fig. 73), is longer (15-18mm) and has silvery white palpal hairs.

This species is named in honor of Dr. Paul C. Beaver of the Tulane University School of Medicine.

Dieladocera calimaensis n. sp.
(Fig. 11E-G, 72)

A medium sized blackish brown species with a grayish yellow beard, unicolorous dark legs, and patterned wings.

Female. Length 12mm; of wing 12.5mm. Frons, palpi and antennae as figured. Frontal index 3.8. Frons grayish pollinose, varying to blackish with changing incidence of light. Callus black. Eyes nearly bare; color not recorded. Subcallus pale yellowish brown pollinose. Frontoclypeus and genae dark yellowish gray pollinose except for a small shiny bare area just below antennae; vestiture of sparse short dark hairs. First antennal segment black with silvery pollinosity; second segment reddish. Basal plate of third segment reddish with yellow pollinosity, annuli black; antennal hairs black. Palpi dark gray with short black hairs. Proboscis with the theca and labella blackish, without sclerotized areas. Beard pale yellow with some grayish hairs interspersed.

Mesonotum and scutellum dark blackish brown with sparse light gray pollinosity; obscurely striped laterally; vestiture of short, sparse black and yellow hairs. Pleura dark gray pollinose sparsely covered with long black hairs except for a small tuft of yellow hairs at the base of the wing. This yellow tuft abuts on a small tuft of black hairs. Pro- and mesocoxae black with grayish pollinosity; metacoxae paler pollinose; all sparsely black haired. Femora black, sparsely black haired. Tibiae and tarsi blackish brown, sparsely covered with short black hairs; no hind tibial fringe. Stem of halteres dark brown, apex of the knob light yellow. Basicosta acute, with about 18 small setae. Wing pattern dark brown.

Abdomen black dorsally with dark bluish gray pruinosity; sides of tergites 2-4 with small tufts of silvery white hairs. Ventrally abdomen black with dark bluish gray pruinosity; vestiture of short black hairs; apical borders of sternites 1-6 sparsely white haired.

Male. Not known.

Distribution: Colombia (Valle).

Material examined. Colombia: Holotype ♀ Valle, Lago Calima, 8km below dam, 1250m, biting livestock, 22 Aug. 1975, R. Wilkerson coll. Paratypes; Valle; Lago Calima, most collected from livestock, one in a flight trap baited with CO₂, and a few netted when attracted to man, 4♀♀ July 1975, 20♀♀ Aug. 1975, 25♀♀ Sept. 1975, 5♀♀ 10 Oct. 1975, 18♀♀, Nov. 1975, 1♀, 13 March 1976, 5♀♀ April 1976.

Discussion. The paratypes range in length from 10-13mm (N=17, \bar{x} =11.4mm). Frontal indices range from 3.4-4.6 (N=20, \bar{x} =4.0, 1SD=0.26). Dorsal antennal tooth length is fairly constant with the exception of a single specimen with a short tooth. A few show a yellow basal plate with more or less distinct black annuli. The wing patterns vary in intensity of color but very little in extent. Some specimens have sparse white hairs on the mid apical margins of tergites 4 and 5.

This species is very close to *D. pruinosa* which has a shorter antennal tooth, black annuli in distinct contrast to the yellow basal plate rather than blending, and the frontoclypeus is largely denuded instead of with a small denuded spot or none.

Three other species, not reported from Colombia, are quite similar. *D. curta* Kroeber (Venezuela, Brazil), *D. nova* Kroeber (Peru, Bolivia) and *D. tribonophora* Fairchild (Ecuador). *D. curta* has a heavier yellow beard, an overall lighter ground color and pilose eyes. *D. nova*

is more robust (12-14mm), has a shorter antennal tooth, beard and body vestiture brown, no white hairs on the apical borders of the abdominal sternites, and the hyaline spot of the discal cell is smaller and rounded. *D. tribonophora* has densely pubescent eyes and a subshiny, yet entirely pollinose, frontoclypeus. It also has a short dorsal antennal tooth and black annuli in distinct contrast to the yellowish orange basal plate.

One specimen of *D. pruinosa* was collected with *D. calimensis* at Lago Calima.

Dicladocera clarus (Schiner)

Tabanus clarus Schiner 1868, Reise Novara, Dipt., p. 88, ♀.
Krober 1934, Rev. Ent., 4(2):308, references. Fairchild 1967, Pacific Insects; 9(2):245.

Dicladocera clarus: Fairchild 1971, Cat. Dipt. S. Amer., Fasc. 28, p. 73, synonymy.

Dicladocera umbratipenne Fairchild 1958, Ann. Ent. Soc. Amer., 51(6):522, ♀, fig. 1.

A medium sized dark blackish brown species with yellowish orange antennae, pilose eyes, a black beard, unicolorous black legs, faintly marked wings, and abdomen with white hair patches laterally and across the entire posterior border of tergite 4.

Female. Length 11-13mm (N=20, \bar{x} =11.6mm). Frontal index 2.6-3.5 (\bar{x} =3.1). Frons pale yellow or dark gray pollinose depending on incidence of light, vestiture of sparse, thin dark hairs. Vestiges of an ocellar tubercle present. Callus drop shaped, shiny blackish brown. Eyes covered with many medium length hairs; color not noted.

Subcallus yellowish brown pollinose. Genae dark gray pollinose. Frontoclypeus dark brown pollinose. First 2 antennal segments dark brown, the third bright yellowish orange; antennal hairs black. Palpi blackish brown covered with many short black hairs. Proboscis short and stout, labella fleshy. Beard black.

Mesonotum blackish brown, with sparse, short black hairs. Pleura and coxae dark brown, grayish brown pollinose with long black hairs. Other leg segments black, hairs dark. Basicosta with at most a few short setae. Wings hyaline, the light brown pattern faint.

Abdomen above blackish brown, subshiny, clothed with short black hairs; small white lateral hair patches on tergites 2-4 and a distinct border of pale hairs on the posterior margin of tergite 4, in some specimens forming a broad triangle. Ventrally abdomen blackish brown with a broad diffuse median bluish pruinose stripe; vestiture of sparse black hairs with a few pale hairs on the posterior margins of sternites 2-5.

Male. A male from Peru agrees well with above description although it has more numerous and longer hairs. The eye facets are well differentiated but not sharply demarcated; the smaller facets occupy the lower third of the eye and continue in a broad band laterally and dorsally to the vertex.

Distribution. Colombia (Valle), Venezuela, Ecuador, Peru.

Material examined. Holotype of *D. umbratipenne* "Rogue," east Andes, country unknown. Ecuador, 1[♀] paratype of *D. umbratipenne*. Ecuador 1[♀], Santa Domingo. Peru, 1[♂]. Colombia: Valle; Penas Blancas, one taken in a flight trap, the remainder from horses, 7^{♂♂} Aug. 1973, 22^{♂♂} July 1975, 25^{♂♂} Aug. 1975, 10^{♂♂} Sept. 1975; Lago Calima, from live-stock, 1[♂] 8 Aug. 1975, 1[♀] 22 Aug. 1975.

Discussion. The specimens taken in Colombia agree very well with the paratypes of *D. umbratipenne* examined. Eight specimens were collected during biting collections with a bait horse. Time 0945-1330hrs; temperature, 21-27.5°C; RH 57-76%. The sun was shining during the capture of all but one. The stomach and upper legs were attacked most often. One specimen was taken from man.

Dicladocera dalessandroi n. sp.
(Figs. 12G-1, 59)

A medium sized dark brown species with a dark brown beard, blackish brown legs, patterned wings and a broad pale triangle on abdominal tergite 4.

Female. Length 13mm; of wing 10mm. Frons, antennae and palpi as figured. Frontal index 5.6. Frons yellowish gray pollinose; vertex and ocellar area subshiny brown. Ocellar area slightly raised; tubercle brown with vestiges of ocelli. Frontal vestiture of short sparse black hairs, slightly longer at vertex. Callus brown. Eyes with a few very short hairs; coloration or pattern not noted. Subcallus, frontoclypeus, and genae pale yellowish brown pollinose. Antennae brown; first segment light yellow pollinose, second and third sparsely pollinose; hairs black. Palpi brown, black haired. Proboscis short, labella fleshy. Beard dark brown.

Mesonotum brown, pale yellow pollinose. Coloration lighter laterally and along longitudinal sutures. Vestiture of small, sparse black hairs slightly longer on and around notopleural process; a few yellow hairs laterally and on longitudinal sutures. Pleura brown, pale brown pollinose; hairs sparse, a few long thin hairs anteriorly and two

small tufts just below wing bases. Procoxae dark brown, light brown pollinose with a few long black hairs. Meso- and metacoxae brown with pale brown pollinosity and a few black hairs. Femora dark brown, hairs rather short and brownish black. Tibiae and tarsi as femora but with slightly lighter pollinosity. Halteres yellowish brown. Basicosta with about 12 short setae. Wings brownish as figured.

Abdomen brown above, pale yellow pollinose; posterior edges of each segment slightly lighter. Vestiture of segments 1 and 2 sparse (perhaps rubbed), of small black hairs; remaining segments have numerous small black hairs; segment 3 with a few pale hairs on the lateral margins; segment 4 with a broad dilute median triangle of yellow hairs. Venter dark brown, gray pollinose, posterior margins of segments lighter. Vestiture a moderate number of small black hairs.

Male. Not known.

Distribution. Colombia (Valle).

Material examined. Colombia: Valle, Holotype, ♀, Lower Anchicaya, 400m, 10 Aug. 1973, Wilkerson and Young coll.

Discussion. *D. dalessandroi* resembles *D. argentomacula* but the overall color of the present species is brown, including the beard and other body hairs, and the mesonotum is brown and only faintly striped. However, *D. argentomacula* has a pale gray beard, pleura, and overall pollinosity with a striped brown and grayish brown thorax. In addition the frons of *D. dalessandroi* is narrower, frontal index 5.6 vs. 3.1-4.3 for *D. argentomacula*.

This species is named in honor of Dr. Antonio D'Alessandro, director of the International Center for Medical Research in Cali, Colombia.

Dieladocera distomacula n. sp.
(Figs. 12J-L, 63, 64)

A large reddish brown and black species with orange yellow beard and pleura, unicolorous black legs, wing veins margined reddish brown, and abdomen shiny black.

Female. Length 16mm; of wing 16mm. Frons, antennae, and palpi as figured. Frontal index 3.4. Frons light grayish yellow pollinose, with short, sparse black hairs. Callus shiny blackish brown. Small shiny patch at vertex dark brown. There are vestiges of ocelli below this patch but they are quite faint, mostly hidden by the pollinosity. Eyes pilose with a moderate number of short hairs; bright green in life. Subcallus with a dark brown ground color showing through slightly rubbed grayish yellow pollinosity. Genae and frontoclypeus grayish yellow pollinose beset with pale yellow hairs. Antennae black, black haired, the first segment grayish pollinose. Palpi blackish gray pollinose, black haired. Proboscis a third longer than palpi, labella fleshy. Beard orange yellow.

Mesonotum striped black and reddish brown. Middorsal stripe between reddish brown longitudinal sutures black on anterior three-fourths reddish brown to scutellum. Two lateral stripes above notopleural lobes black. Extreme lateral areas cream colored and brown. Vestiture of sparse black hairs above, and a mixture of longer black and yellow hairs laterally with black hairs on the notopleural lobes. Scutellum reddish brown with a central transverse black area. Pleura and coxae pale grayish brown pollinose with long orange yellow hairs, most numerous below wing base. Procoxae with long orange yellow hairs except for a few black hairs at the apex. Femora, tibiae, and tarsi deep blackish brown, dark haired; profemora vaguely lighter basally.

Halteres yellow brown, base of knob dark brown. Wings light reddish brown, only vaguely patterned; all vein margins pigmented. Basicosta with about 12 small setae.

Abdomen shiny black, the first segment with sparse grayish pollinosity. Vestiture of short black hairs; tergite 4 above with a middorsal apical patch of white hairs about a fourth as wide as the segment; sternites 2-4 with small lateral white hair patches.

Male. Not known.

Distribution. Colombia (Cauca).

Material examined. Colombia: Holotype, ♀, Cauca, Cerro de Munchique, altitude 2450m, netted, 7 Aug. 1975, R. Wilkerson coll. Paratypes, same locality, 1♂ 7 Aug. 1975, 1♀ 8 Aug. 1975.

Discussion. The two paratypes are 14mm long and have frontal indices of 3.1 and 3.3. The paratypes agree well with the above description.

Distomacula is very close to *D. macula* and *D. submacula*. Both have shorter antennae than this species and *submacula* has the tip of the dorsal tooth slightly upturned. *Macula* has longer palpi than *distomacula* and *submacula* shorter palpi. The wings of both these related species are lightly patterned and do not exhibit pigmentation on all vein margins (see Figs. 52, 53). Vestiture of *macula* is brighter orange yellow, that of *submacula* light yellow.

Dieladocera hirsuta n. sp.
(Figs. 11H-J, 62)

A medium sized robust, hairy, blackish brown species with a light yellow beard, wing vein margins tinted dark brown, and abdomen with 2-3 middorsal yellow triangles.

Female. Length 15mm; of wing 14mm. Head structures as figured. Frontal index 2.5. Frons swollen, basal two-thirds dark brown, silver gray pollinose; ocellar area and vertex subshiny brown with less pollinosity; upper lateral areas adjacent to tubercle light brown, silver gray pollinose. Tubercle brown, ocellar vestiges evident. Frontal vestiture of a moderate number of black hairs, especially long at the vertex. Callus dark brown. Eyes moderately pilose, hairs short but longer and denser toward the center. Color or pattern not noted. Subcallus, frontoclypeus and genae pale yellow pollinose. First antennal segment black, light yellow pollinose; second and third similar with less pollinosity. Antennal hairs black. Second palpal segment dark brown, light yellow pollinose, black haired; first segment with many long yellow hairs. Proboscis short, labella fleshy. Beard with numerous long yellow hairs.

Mesonotum grayish black pollinose with lateral and sublateral blue gray pollinose stripes. Vestiture is of numerous small black and coppery hairs. Notopleural lobes covered with black hairs, directly anterior to these are thick tufts of white hairs. Pleura gray pollinose, quite hairy; vestiture directly behind the head and extending to and including forecoxae is light yellow; anterior to wing base is a white tuft, below the white tuft is a mixture of yellow and black hairs; and below the squamae is a yellow tuft. Coxae gray pollinose; procoxae with many long light yellow hairs; meso- and metacoxae black-haired. Femora black, dark blue pollinose covered with black hairs, longer hairs predominating posteriorly. Basal halves of tibiae yellow pollinose blending to dark gray pollinose apically; pro- and mesotibiae with a few slender black hairs throughout with some shorter yellow or

black hairs corresponding to light and dark areas of the segments; hind tibiae with longer, mostly dorsal hairs, with some shorter yellow hairs basally and black hairs apically. Tarsi dark gray pollinose covered with small black hairs. Halteres with a yellow stalk and light gray knob. Basicosta bare. Wings light brown with dark brown infuscation on all vein margins.

Abdomen above black, dark gray pollinose; vestiture a thick mat of short black hairs. Tergites 4-6 with somewhat rounded nearly equilateral triangular patches of shiny yellow hairs, each about a third width of tergite. Ventrally abdomen black, blue gray pruinose, evenly beset with slender black hairs.

Male. Not known.

Distribution. Colombia (Cauca).

Material examined. Colombia: Holotype, ♀, Cauca, Parque de Purace, Lago San Raphael, 3500m, flight trap baited with CO₂, 10 March 1976, R. Wilkerson coll. Paratypes, 4♀♀, same data as holotype and 1♂ ex. cow same locality, 26 Feb. 1976.

Discussion. All paratypes agree well with type with some small variations. Lengths 15-15mm; frontal indices 2.2-2.8 (\bar{x} =2.5). Abdominal triangles of segment 6 not distinct on two. Wing color faint brown instead of blackish brown on one specimen.

This species is similar to and was taken together with *D. leei* Fairchild. The following differences are noted: *D. leei* has an overall brown coloration rather than blackish brown; a coppery beard instead of light yellow and broad golden yellow and/or coppery wider than high triangles on segments 4-6 (sometimes on 2-7), one or more

of these often extending to the segment margins, while the triangles of *D. hirsuta* are much narrower and yellow haired.

D. hirsuta is evidently quite seasonal since many collecting efforts resulted in specimens being taken only in Feb. and March. They were on the wing during periods of sunshine which is understandable considering the large drop in temperature accompanying cloud cover at this altitude.

Dicladocera leei n. sp. Fairchild
(Figs. 11A-D, 74)

A stout and very hairy fly with brownish wing pattern, the abdomen with prominent broad silver haired triangles on tergites 4-6.

Female. Length 16.5mm; of wing 14mm. Eyes moderately densely long pubescent, the hairs longer and denser towards middle of eye. Frons, antenna and palpus as figured. Frons silvery pollinose on lower third, brown or silvery on remainder depending on incidence of the light, densely clothed with curved black hairs on upper third, curved golden hairs on lower two-thirds. Callus and tubercle at vertex dark brown, the latter without evident vestiges of ocelli. Subcallus, fronto-clypeus and genae silver gray pollinose. Beard and a patch of short curved hairs on either side of subcallus golden. First and second antennal segments black, gray pollinose, with long black hairs dorsally, pale hairs below. Third segment all black. Palpi brown, gray pollinose, first segment golden haired, second black haired. Proboscis short, labella fleshy.

Mesonotum dark brown in ground color, with a pair of gray pollinose median stripes which join before scutellum and lateral margins

broadly gray pollinose. Scutellum gray pollinose. Vestiture is dense, of long erect black hairs, and long recumbent coppery red hairs. Notopleural lobes clothed with denser hairs which are coppery at base, silver at tips. There is also a vague patch of whitish hairs above wing bases. Pleura gray pollinose, covered with dense and long reddish orange hairs, except for a small area of cottony white hairs just beneath wing bases. Procoxae blackish brown, orange haired, remaining coxae paler, sparsely black haired. Femora black or dark brown, the prothoracic pair wholly long black haired, the last two pairs black-haired ventrally, orange haired dorsally. Tibiae dull yellowish brown, vaguely darker towards tips, clothed with mixed dark and golden hairs, the latter predominating basally and on internal aspects of the segment. Tarsi dusky, black haired dorsally, rufous haired below. Wings with tips defective. Basicosta acutely pointed, with a small cluster of about 8 strong setae. Venation normal, wings dilute brownish, veins broadly to narrowly dark brown margined, the most intense color being in an ill-defined area below stigma and around ends of basal cells and base of discal cell, though most of the latter is hyaline, as are basal cells and base of marginal cell. Halteres with pale stem and largely blackish knob.

Abdomen above black, bluish pruinose on first 2 or 3 segments. Vestiture of fairly dense long black hairs on first two and bases of remaining tergites. Tergites 2-5 with yellowish white hairs at posterior lateral corners, tergites 3-5 with pale haired hind marginal bands, widened into an indistinct broad triangle on tergite 3, but into broad prominent shiny silver haired triangles on tergites 4-6.

Beneath the abdomen is black, bluish pruinose, sparsely black haired, but with sparse yellow haired hind-marginal bands on all segments.

Male. Length 16.5mm; of wing 14.5mm. Eyes holoptic, densely pilose, enlarged facets well demarcated and differentiated from small facets, occupying about two-thirds eye area, the pilosity denser and longer on the large facets. A small tubercle sunk between eyes at vertex. Frontal triangle silvery pollinose, with large patches of long erect black hairs on each side of subcallus. Antennae as figured. Face gray pollinose, rufous haired. Palpi porrect, dark brownish, black haired, long oval, the tips slightly falcate.

Mesonotum, pleura and legs essentially as in female, though lacking the pale hair tufts on notopleural lobes and above and below wing bases, having pleural hairs mostly black, and pale pollinose stripes indistinct. Wings more dilutely tinged, but pattern of dark area below stigma and fenestrate discal cell more distinct. Abdomen as in female, though only first tergite pruinose above, and hairs denser and longer.

Distribution. Colombia (Cauca).

Material examined. Colombia: Holotype, ♀, Cauca, Paramo de Purace, Serra de Purace, vic. Cali, 3500m, 5 Dec. 1963, Vernon Lee coll. Allotype, same locality, 3200m, 18 Feb. 1965, V. Lee coll. Paratypes. Colombia: Cauca; Parque de Purace, Lago San Rafael, 3500m, from cows and CO₂ baited flight trap, 13⁰⁰ 10 March 1976, R. Wilkerson coll; same locality, from flowers, 4⁰⁰ 10 March 1976, H. Weems coll.

Discussion. The species seems related to *D. submacula* Walker and *D. hoppi* Enderlein, but is smaller, lacks the shiny abdomen, has a shorter antennal tooth, and much greater development of silver hairs

on abdomen. *D. hirsuta* n. sp. is the most closely related species, see that section for discussion of their differences.

Named in honor of the collector, Dr. Vernon H. Lee.

Dicladocera macula (Macquart)
(Fig. 65)

Tabanus macula: Macquart 1846, Mem. Soc. Roy. Sci., Agri. Arts Lille, p. 171, pl. 4, fig. 3, ♀, ?Colombia.

Dicladocera macula: Krober 1940, Verhoff. Deutsche Kol. Mus. Bremen, 3(1):71, pl. 4, fig. 6, pl. 5, fig. 7. Fairchild 1971, Cat. S. Amer. Dipt. Fasc. 28, p. 73, synonymy.

Dasycheila macula: Bequaert and Renjifo 1946, Psyche, 53(3-4):70 (in part). Fairchild 1956, Smith. Misc. Coll., 131(3):22, synonymy.

A medium to large reddish brown to black species with orange yellow beard and pleura, unicolorous dark brown legs, faintly patterned wings, and a shiny dark abdomen with small white hair patches laterally on tergite 2, mesially on tergite 4 and laterally on sternites 2-4.

Female. Length 14-17mm (\bar{x} =16.0). Frontal index 2.7-4.0 (N=7, \bar{x} =3.2). Frons yellowish brown to grayish yellow pollinose, beset with short dark hairs. Callus brown to blackish brown, elongated drop-shaped, reaching two-thirds the way to vertex and not touching sides of frons. At the vertex there is a shiny dark brown patch. Eyes sparsely pilose, the hairs short; color not noted. Subcallus, genae and frontoclypeus grayish yellow pollinose. Antennae blackish brown, the first segment with some grayish pollinosity. Palpi grayish brown pollinose with many short black hairs. Proboscis a third longer than palpi. labella fleshy. Beard orange yellow.

Mesonotum striped; cream colored and reddish brown laterally, reddish brown on longitudinal sutures, the remainder black. Scutellum reddish brown. Vestiture a mixture of black and orange yellow hairs. Pleura and coxae dark gray pollinose with long orange yellow hairs. Femora dark blackish brown, tibiae and tarsi dark reddish brown. Leg hairs dark. Basicosta with a few short setae. Wings faintly patterned reddish brown.

Abdomen shiny dark reddish brown; black haired with small white hair patches laterally on tergite 2, mesially on tergite 4 and laterally on sternites 2-4.

Male. Not known.

Distribution. Colombia (Huila, Cundinamarca, ?Valle, ?Magdalena), Venezuela, Equador, Peru, Bolivia.

Material examined. Ecuador, 2^{♀♀} (including one compared by G. B. Fairchild to types of *Tabanus macula* and *Tabanus auribarbis* Macquart. Peru, 2^{♀♀} (including one compared by C. B. Philip to types of *T. macula*, *T. auribarbis* and *T. submacula* Walker). Colombia: Huila; 20km W of Leticia, 2000m, from horse, 1[♀] 26 Feb. 1976. Cundinamarca; Bogota, Arrayan, 3000m, 1[♀] Dec. 1942. Fusagusaga, Fr. Apollinaire-Marie, 1[♀] 1924; Parambo, 12,600ft, 1[♀] Sept. 1911.

Discussion. *D. macula* is quite close to *D. submacula* and *D. distomacula*, distinguishing characters are discussed with the description of *D. distomacula*. *D. macula* is found in cool wet high altitude ecological zones. In addition to the above localities Bequaert and Renjifo (1946) report *D. macula* from Magdalena, NW Sierra Nevada de Santa Marta and San Lorenzo Mts. and Valle, La Cumbre. Since

Bequaert and Renjifo considered *submacula* (Walker) to be a synonym of *macula* I cannot be certain these are in fact legitimate *macula* localities.

Dieladochera minos (Schiner)
(Fig. 13A-C, 68)

A medium to large dark brown fly with a dark brown beard, striped mesonotum, bicolored dark brown and light brown legs, patterned wings, and middorsal pale hair patches on last few abdominal segments.

Female. Length 16mm; of wing 16mm. Eyes bare, no color noted. Frons, antennae and palpi as figured. Frontal index 3.3. Frons pale yellow pollinose basally, grayish pollinose at vertex. Ocellar area slightly raised decorated with a small shiny brown inverted "Y." Callus brown below; upper two-thirds dark brown, rugose. Subcallus, yellow pollinose; frontoclypeus and genae pale yellow pollinose. Subcallus with a few small dark hairs. First antennal segment dark brown, second segment brown, third dark brown, light brown at base; all segments yellowish pollinose and black haired. Palpi light brown, light yellow pollinose; hairs black changing to amber depending on incidence of the light. Proboscis short and unsclerotized; labella fleshy. Beard of sparse black hairs.

Mesonotum striped black and brown, pale yellow pollinose. Laterally the mesonotum is pale brown. Above these lateral areas are 2 black stripes separated from a broad median black strip by thin light brown lines which follow longitudinal sutures. The posterior fourth of the median area is brown. Vestiture rubbed, that remaining consists of short dark and amber hairs. Ground color of scutellum

black, light brown laterally; vestiture and pollinosity as mesonotum. Pleura light brown; gray pollinose ventrally, pale yellow pollinose toward wing bases; hairs sparse and black except for a tuft of light yellow hairs at wing base. Coxae dark, gray pollinose. Protibiae black; meso- and metatibiae brown, slightly lighter apically. Tibial hairs thin and black. Femora light brown, hairs amber. Tarsi as femora but slightly darker. Halteres with a yellow stem, knob yellow apically with a black base. Basicosta with approximately 4 long and 15 short setae. Wings patterned brown with dark brown markings.

Abdomen black dorsally, blue gray pruinose with black hairs, primarily on apical margins. Small tufts of middorsal light yellow hairs on segments 4-6 and laterally on 1-4. Ventrally abdomen black, blue gray pruinose; hairs sparse, black, except for small pale tufts at the posterolateral margins of sternites 2-5.

Male. Not known.

Distribution. Colombia (Cauca).

Material examined. Ecuador, 2 σ^{σ} (1 compared to type *D. minos* by G. B. Fairchild). Colombia: Cauca; Silvia, 3100m, ex. man, 1 σ
28 June 1975.

Dicladocera nigrocoerulea (Rondani)
(Fig. 73)

Tabanus nigrocoeruleus Rondani 1850, Nuov. Ann. Rend. Accad.
Sci. 1st Soc. Agric. Bologna (3)2:191.

Dicladocera nigrocoerulea: Fairchild 1971. Cat. S. Amer. Dipt.
Fasc. 28, p. 74, synonymy.

A large black species with a white beard, silvery white palpi, unicolorous black legs, patterned wings, and a shiny black abdomen with several lateral pale hair patches and a single middorsal pale patch.

Female. Length 15-18mm ($n=15$, $\bar{x}=16.9$). Frontal index 3.1-3.9 ($\bar{x}=3.5$). Frons slightly widened above, blackish brown in ground color with silver gray pollinosity and short black hairs. Vestiges of ocelli present but indistinct; area at vertex with a shiny stripe. Callus blackish brown and large, tapering evenly to a point near vertex. Eyes bare; green in life. Subcallus, genae and frontoclypeus silver gray pollinose. Small patches on either side of subcallus are shiny, dark brown, without pollinosity. Antennae black or blackish brown, black haired; first segment silver gray pollinose, dorsal tooth of third segment long, reaching to at least first annulus. Palpi with silver gray pollinosity and hairs. Proboscis short, stout; labella fleshy. Beard white.

Mesonotum and scutellum black with sparse pale pollinosity with dense pollinosity laterally and anteriorly along longitudinal sutures. Vestiture is of short black hairs, longer posteriorly. Pleura black with sparse grayish pollinosity. Procoxae silver gray pollinose, silvery white haired basally, black haired apically. All other leg segments black, black haired; the protibiae with some short pale hairs. Wings patterned, blackish brown.

Abdomen shiny black with short black hairs; tergites 2 and 3, and sternites 2-4 with small lateral white or pale yellow hair patches; tergite 4 with a small rectangular or triangular median apical pale patch.

Male. The male from Venezuela, Avila Peak, Caracas, agrees with the above description except in being slightly lighter overall. The eyes have well differentiated and demarcated facets, the smaller facets are present on the lower fourth continuing posteriorly in a thin border reaching to the vertex and the palpi are short, porrect and have many slender white and black hairs.

Distribution. Panama, Colombia (Valle, "Santa Fe de Bogota"), Brazil, Venezuela, Ecuador, Peru.

Material examined. Venezuela, 4♀♀, 1♂ (including 1♀ compared to types of *Stigmatophthalmus lutsi* Surc., *Dieladocera acheronitens* Krob., and *D. nigrocoerulea*). Ecuador, 1♀. Panama, 1♀. Colombia: Valle; Penas Blancas; from horses, cattle, and in flight traps, 1♀ 4 Aug. 1973, 1♀ 21 Jan. 1975, 4♀♀ 1 Feb. 1975, 1♀ 30 June 1975, 1♀ 10 July 1975, 2♀♀ 11 Aug. 1975, 2♀♀ 27 Feb. 1976, 10♀♀ March 1976; Lago Calima; 1♀ 26 March 1976.

Discussion. *D. nigrocoerulea* is similar to *D. riveti* and *D. beaveri*. *D. beaveri* differs by having wings without a distinct pattern and black instead of silvery white palpal hairs. *Riveti* has a black beard instead of white, a narrower frons (index of 4.5 instead of 3.5) and a dull black instead of shiny black abdomen.

Dieladocera pruinosa n. sp.
(Figs. 12D-F, 71)

A small to medium sized dark brown species with antennal basal plate yellow orange and annuli black, frontoclypeus nearly completely shiny blackish, beard dark brown, unicolorous dark legs, patterned wings, and broad pale hair patches on abdominal tergites 4 and 5.

Female. Length 12mm; of wing 11mm. Frons, palpi, and antennae as figured. Frontal index 3.1. Frontal ground color blackish brown showing through grayish brown pollinosity. Ocellar area at vertex slightly raised with a shiny blackish brown median spot. Frontal hairs of moderate size and density, longer at the vertex. Callus shiny blackish brown. Eyes sparsely covered with short hairs; color not noted. Subcallus yellow brown pollinose. Genae dark grayish brown pollinose. Frontoclypeus dark grayish brown pollinose laterally and just above palpi, the remainder shiny blackish brown. Antennal segments 1 and 2 pale brown and black haired with sparse grayish pollinosity; segment 3 with basal plate yellow orange and annuli blackish brown, contrasting. Palpi dark grayish brown pollinose and short black haired. Proboscis a third longer than palpi, unsclerotized, labella fleshy. Beard of slender sparse blackish brown hairs.

Mesonotum and scutellum dark brown in ground color and dark grayish brown pollinose, faintly striped with grayish pollinosity laterally and along longitudinal sutures. Vestiture a mixture of moderately long and dense black and coppery hairs. Pleura blackish brown in ground color and grayish brown pollinose, hairs long slender and black except for small tufts of light yellow hairs just anterior to the wing bases. Coxae dark blackish brown with sparse pale gray pollinosity and long dark hairs. Other leg segments blackish brown and dark haired. Halteres light yellowish brown, base of knob dusky. Basicosta with about 12 small setae. Wings patterned dark brown.

Abdomen blackish brown, dark blue pruinose covered with short black hairs which are more numerous, above, laterally, and on last segments. Tergites 2 and 3 with small lateral pale yellow hair

patches. Tergite 4 with pale yellow hairs along nearly entire posterior margin, more numerous toward the middle, forming a broad irregular triangle reaching a fourth the distance to the preceeding segment at its apex. Tergite 5 with pale yellow hairs along middle third posterior margin. Sternites 2-6 with pale posterior borders which bear a few pale yellow hairs.

Male. Not known.

Distribution. Colombia (Valle, Cauca).

Material examined. Colombia: Holotype, ♀, Valle, Penas Blancas, from flight trap, 1 Aug. 1973, Wilkerson and Young coll. Paratypes, Valle; Penas Blancas, from horses and flight trap, 1♀ Aug. 1973, 1♂ 7 Aug. 1973, 1♀ 5 Aug. 1975; "T.V. Tower Mountain," 2♀♀ 8 Aug. 1973; Lago Calima, from livestock, 1♂ 8 Aug. 1975; Cauca; Cerro de Munchique, netted, 2♀♀ 7 Aug. 1975.

Discussion. *D. pruinosa* is quite similar to *D. tribonophora* and *calimaensis*. *Tribonophora*, however, has densely pubescent eyes and a subshiny, yet entirely pollinose, frontoclypeus. *D. calimaensis* has at most only a small shiny spot in the center of the frontoclypeus, a long dorsal tooth, and basal plate and annuli not of distinctly different colors.

Some variation exists among the paratypes. Length 10-12mm. Frontal index 3.1-4.1 ($\bar{x}=3.5$). The dorsal tooth of the specimen from Lago Calima is shorter than the holotype and slightly longer in 2 from Penas Blancas. They agree otherwise fairly well except for relative lack of hairs on the more rubbed specimens.

It is perhaps noteworthy that all the specimens were taken in August although from 3 different localities and 2 different years.

Dicladocera riveti (Surcouf)
(Fig. 60)

Tabanus riveti Surcouf 1919, Miss. Serv. Geog. l'Armee pour la mesure d'un arc de meridien en Amer. Sud 10(2) (Dipteres): 226, fig. 29.

Dicladocera riveti: Kroker 1940, Verhoff. Deutsche Kol. Mus. Bremen, 3(1):82, ♀, pl. 6, figs. 11a-c, pl. 4, fig. 12.

A large black species with a blackish brown beard, unicolorous dark legs, patterned wings and a subshiny black abdomen with lateral white spots above and below and a median white spot above.

Female. Length 9-17mm (N=5, \bar{x} =15.2mm). Frontal index 4.0-5.3 (\bar{x} =4.5). Frons black with grayish black pollinosity and short black hairs. Callus black, tapering to a point half way up frons. Eyes bare, color not noted. Subcallus, genae and frontoclypeus pale yellowish gray pollinose. Antennae black, black haired; dorsal spine long, reaching past first annulus. Palpi black, grayish black pollinose with many short black hairs. Proboscis short, stout; labella fleshy. Beard blackish brown.

Mesonotum and scutellum blackish brown with sparse grayish pollinosity; stripes formed laterally and along anterior half of longitudinal sutures by paler pollinosity; vestiture of short black hairs. Pleura and coxae brown to blackish brown, pale gray pollinose; vestiture of dark brown hairs. Remaining leg segments black and dark haired. Wings patterned blackish. There are small tufts of white hairs on the squamae and on the wing bases in front of the basicostae.

Abdomen black, bluish black pruinose; covered with many short black hairs. Tergites 2 and 3, and sternites 2-5 with small lateral pale hair patches; tergite 4 with a small median apical pale patch.

Male. Not known.

Distribution. Ecuador, Colombia (Valle).

Material examined. Ecuador, 3^{♂♂}. Colombia: Valle; Lower Anchicaya, netted, 1[♀] 13 Aug. 1975; Rio Zabaletas, netted, 1[♀] 11 Aug. 1975.

Discussion. This species very much resembles *D. nigrocoerulea* except in having a black beard instead of white, a narrower frons, $\bar{x}=4.5$ vs. $\bar{x}=3.5$, and the abdomen dull black rather than shiny black.

Dicladocera rubiginipennis (Macquart)
(Fig. 70)

Tabanus rubiginipennis: Macquart 1846, Mem. Soc. Roy. Sci., Agr. Arts Lille, p. 167, [♀].

Dicladocera rubiginipennis: Kroeber 1940, Verhoff. Deutsche Kol. Mus. Bremen 3(1):88, pl. 6, figs. 18a-c. Fairchild 1971, Cat. S. Amer. Dipt. Fasc. 38, p. 74, synonymy.

Tabanus adustus Walker 1850, Insecta Saundersiana, Diptera, 1:34, [♀], Columbia.

A medium to large sized species with a blackish brown thorax, reddish brown to dark reddish brown abdomen, yellow beard, unicolorous dark legs, and unpatterned wings reddish brown basally, smoky brown apically.

Female. Length 13-17mm (N=11, $\bar{x}=15$ mm). Frontal index 3.2-4.3 ($\bar{x}=3.6$, 1SD=.3). Frons light yellow or brown pollinose depending on the incidence of the light, vestiture of sparse short black hairs. Ocellar area at vertex shiny brown. Callus brown, narrowly drop shaped. Eyes with a few very short hairs; color not noted. Subcallus,

genae and frontoclypeus grayish yellow pollinose. Antennae dark blackish brown with some sparse light grayish pollinosity. Palpi grayish yellow pollinose with many short black hairs. Proboscis two-thirds as high as head, stout; labella fleshy. Beard light yellow.

Mesonotum and scutellum blackish brown in ground color, yellowish brown pollinose. Mesonotum indistinctly striped laterally and along longitudinal sutures; vestiture of sparse black and pale yellow hairs. Pleura and coxae grayish yellow pollinose, sparsely long yellow haired except for a dense yellow patch beneath wing bases. Femora and metatibiae dark blackish brown, dark haired except for some long yellow hairs on the mesofemora. Pro- and mesotibiae dark reddish brown, dark haired. Tarsi black. Basicosta with 25 or more small setae. Wings unpatterned, costal cells reddish brown; basal half to two-thirds light reddish brown, the remainder smoky brown.

Abdomen reddish brown to dark reddish brown, the last few segments sometimes dusky. Vestiture of short black hairs, more numerous laterally. Tergite 4 sometimes with a small median apical patch of white hairs.

Male. Not known.

Distribution. Ecuador, Colombia (Cauca).

Material examined. Ecuador, 5^{♂♂}, (including 1 compared to types of *rubiginipennis* and *adustus*). Colombia: Cauca; Cerro de Munchique, 11^{♂♂} 6-8 Aug. 1975.

Discussion. All specimens here agree more or less with the homotype in collection of G. B. Fairchild. Some have a much darker ground color, others lighter. Several exhibit a brighter yellow beard.

D. rubiginipennis is very close to a group of *Tabanus* species including *T. macquarti* Schiner and *T. bigoti* Bellardi. It is placed at this time in *Dicladocera* by virtue of having only a partially setose basicosta and faint vestiges of ocelli.

Dicladocera submacula (Walker)
(Fig. 66)

Tabanus submacula Walker 1850, *Insecta Saundersiana*, Diptera, 1:30, pl. 2, fig. 8, ♀, Columbia.

Dasychela submacula: Bequaert and Renjifo 1946, *Psyche*, 53(3-4):70 (in part). Fairchild 1956, *Smith. Misc. Coll.*, 131(3):29, synonymy.

Dicladocera submacula: Fairchild 1971, *Cat. S. Amer. Dipt.* Fasc. 28, p. 75.

A large deep reddish brown species with a light yellow beard and pleura, dark legs, a striped black and brown thorax, faintly patterned light brown wings, and a shiny dark reddish brown abdomen with small white hair patches laterally on tergite 2, mesially on tergites 4 and 5, and laterally on sternites 1-5.

Female. Length 15-16mm (N=2). Frontal index 2.9-3.1 Frons blackish brown pollinose above, grayish brown below, quite swollen and with numerous black hairs above. Callus shiny brown, elongated drop shaped not touching sides of frons. Eyes covered with many short hairs, color not noted. Subcallus brownish yellow pollinose. Genae and frontoclypeus grayish yellow pollinose. Antennae black, black haired; first segment with some gray pollinosity. Palpi short, dark gray pollinose and covered with many short dark hairs. Proboscis stout, a third longer than palpi; labella fleshy. Beard yellow to pale yellow.

Mesonotum striped; ground color primarily black, reddish brown laterally and along longitudinal sutures. Pollinosity grayish laterally and along longitudinal sutures. Vestiture of long black and pale hairs roughly corresponding to light and dark areas. Pleura and procoxae grayish brown pollinose, yellow haired except for a thick tuft of white hairs on the upper mesoanepisternum and a thick patch of yellowish orange hairs below wing base. Legs black, black haired except basal two-thirds of pro- and mesotibiae which are yellowish brown with some pale hairs. Basicosta with a few short setae. Wings faintly to distinctly patterned, light reddish brown to apices of basal cells, smoky brown or brown apically.

Abdomen shiny dark reddish brown with short black hairs except for small white hair patches laterally on tergite 2, mesially on tergites 4 and 5, and laterally on sternites 1-5.

Male. Not known.

Distribution. Colombia (Boyaca, ?Valle, ?Magdalena), Ecuador.

Material examined. Ecuador, 1 σ° . Colombia: Boyaca; near Muzo, Maripi, 1 σ° 1942, Gast coll, compared with type of *Tabanus submacula*.

Discussion. *D. submacula* is close to *D. distomacula* and *D. macula*, distinguishing characters are discussed with the description of *D. distomacula*.

The Colombian specimen differs from the Ecuadorian specimen by having a darker wing pattern, no middorsal white hair patches (probably rubbed), no ventral hair patches on segment 5, paler palpi, and slightly paler beard and pleural hairs. In spite of these differences I believe them to be conspecific.

Genus *Stibasoma* Schiner

Stibasoma Schiner 1867, Verh. z. b. Ges. Wien, 17:310. Fairchild 1940, Ann. Ent. Soc. Amer., 33(4):684, full references; 1953, Ann. Ent. Soc. Amer., 46(2):267, key.

Rhabdotylus Lutz 1909, Inst. Osw. Cruz em Manguinhos, p. 29. Fairchild 1942, Ann. Ent. Soc. Amer., 35(4):472. Barretto 1951, Arq. Mus. Mac. Rio de Janeiro, 42:72-73. Fairchild 1950, Psyche, 57(4):125.

The genus *Stibasoma* is characterized by being robust often bee-like flies with a long dorsal antennal tooth, usually with swollen tibiae and palpi, and a sclerotized labella. All are arboreal. Subgenus *Stibasoma* usually has patterned wings and is usually quite hairy. Subgenus *Rhabdotylus* has a shorter dorsal spine, the protibiae are only slightly swollen, the wings are not patterned, and the abdomen is greenish.

Key to *Stibasoma* Species

1. Tibiae not inflated. Wings with only costal cell tinted, veins at most lightly brown margined. Abdomen grass green to bluish green in life, fading to yellowish, sparsely black haired except for obscure pale median triangles on second to fifth tergites (*Rhabdotylus*) *venenata*
- 1'. Tibiae inflated. Wings black, yellow or patterned. Abdomen not green 2
- 2(1'). Wings entirely black except for dilute apex and hind margin. First two abdominal tergites densely sulfur yellow haired,

- remaining tergites varying from almost wholly black haired to wholly orange rufous. Subcallus denuded and shiny
(Fig. 77) *panamensis*
- 2'. Wings not entirely black. Abdomen otherwise. 3
- 3(2'). Wings with prominent black markings 4
- 3'. Wings yellowish tinted or vaguely dusky, without prominent black markings. 5
- 4(3). Wings with a prominent subapical black area in outer halves of marginal and first submarginal cells, the anterior half of wing otherwise bright yellow. Abdomen black, the first tergite with a short bright yellow hind marginal band or transverse patch, the second with a complete, narrower yellow band
(Fig. 75) *apicimacula*
- 4'. Wings largely black or brown, but with a prominent yellow hyaline patch from costa, to and including discal cell, and apex beyond tip of R_{2+3} hyaline. Abdomen black or brown above, but with all sternites with broad yellow haired hind margins
(Fig. 76) *chionostigma*
- 5(3'). Large species, over 16mm. Wings deep black at extreme base, remainder yellowish brown tinted basally, the apex and hind margin broadly grayish hyaline. Thorax entirely deep velvety black. Abdomen with first tergite black, second tergite black or usually partly or wholly rufous orange haired, remainder all rufous orange. Second to last tergites with sulfur yellow haired hind marginal bands of variable width
. *flaviventre*

- 5'. Smaller species, less than 14mm. Wings yellowish hyaline to base, the outer margin and apex broadly dusky grayish. Thorax ranging from black to orange rufous haired, with a white to orange hair tuft before wing bases and on each side of scutellum. Abdomen ranging from nearly entirely black to partly orange rufous, always with at least traces of yellow hind marginal bands on tergites 2 and 3, usually all tergites prominently banded. *fulvohirtum*

Stibasoma (Stibasoma) apicimacula Fairchild
(Fig. 75)

Stibasoma apicimacula Fairchild 1940, Ann. Ent. Soc. Amer., 33(4): 686-688, pl. 1, fig. 6, ♀, Panama; 1951, Ann. Ent. Soc. Amer., 44(3): 451-452; 1953, Proc. Ent. Soc. Washington, 55(5):241.

A small to medium deep blackish bee-like species with a shiny black bare frons and partially bare subcallus, dorsal antennal tooth reaching past first annulus, protibia incrassate, legs unicolorous brown, wings yellowish, dark along costal margin with a subapical brown spot, and abdomen with a short patch of yellow hairs on the middorsal apical border of segment 1 and a complete band on segment 2.

Female. The original description of Fairchild follows these additional notes. Length 8-11mm (N=14, \bar{x} =9.6mm). Frontal index 3.9-4.7 (\bar{x} =4.4). Eyes deep purple in Colombian specimen examined.

Frons about 4 times as high as basal width, slightly narrowed below. The whole frons is shiny black, due to the enlargement and spreading of the calli, and only a thin line of gray tomentum remains along the eye-margin. Under proper illumination indications of a rounded basal callus and a spindle-shaped median callus may be seen. There is no vertexal tubercle.

Eyes bare, black with a slight greenish reflection in life. Subcallus denuded, black, shiny and with a deep median groove. Antennae black and black-haired on the first two segments, the third dark brown with golden pollinosity. The basal part of the third segment is more than twice as long as the annulate portion, and bears a long, stout, forward-pointing tooth which just reaches the first annulus. Annulations not well marked, the terminal longer than the others, sharply pointed. Palpi black, rather stout, sharply pointed, and shorter than the proboscis. Proboscis shorter than head height, black; the black shiny labella at least half as long as whole proboscis. Frontoclypeus and genae black, light gray pollinose, and with sparse black hairs.

Thorax and scutellum black, sparsely gray pollinose above. The prescutal lobe is conspicuously silvery pollinose. Pleura black, abundantly black-haired, except a tuft of silver white hairs just before the wing bases. Wings with the costal, basal, and bases of first and second submarginal cells orange yellow, and with a conspicuous brown spot filling the apices of the first and second submarginal cells beyond the stigma. Rest of wing hyaline. Subepaulet without macrotrichia. All cells but anal open; no appendix on third vein.

Legs entirely black and black-haired, except that the bases of all tibiae bear sparse white hairs. The usual dense fringes of the tibiae are much reduced in this species, only a rather sparse row of long hairs on the hind tibiae being present. All tibiae somewhat swollen, the fore pair markedly so.

Abdomen black, for the most part shiny. The first tergite bears a median transverse patch of long pale yellow hairs on its hind margin, and the second tergite bears a complete transverse band of similar but shorter hairs on its hind margin. The remainder of the abdomen is wholly black. Beneath, all the sternites bear narrow yellowish hind-marginal bands. (1940, pp. 686, 688)

Male. Not known.

Distribution. Costa Rica, Panama, Colombia (Valle).

Material examined. Panama, 14^{♂♂}. Colombia: Valle; Rio Zabaletas, 4km E Zabaletas, attracted to man at ground level, 1[♀] 20 Oct. 1975.

Discussion. *S. apimacula* is evidently an arboreal species, Fairchild (1951, 1953) reports collections in Panama at 40ft. and 12m in trees. Lee et al. (1969) reported the first Colombian record of 7^{♀♀}

caught 18m in the forest canopy between Jan. and June 1964. Of these some were attracted to man and 4 were caught in the early morning of cloudy days.

Stibasoma (Stibasoma) chionostigma (Osten Sacken)
(Fig. 76)

Tabanus chionostigma Osten Sacken 1886, Biol. Centr. Amer., Dipt., 1:54, pl. 1, fig. 11, ♀, Guatemala. Knab 1913, Proc. U.S. Nat. Mus. 46, No. 2033, pp. 411.

Stibasoma chionostigma: Fairchild 1940, Ann. Ent. Soc. Amer., 33(4):684-685, fig. 5, Panama, full references. 1964, J. Med. Ent., 1(2):171. Fairchild 1971, Cat. S. Amer. Dipt. Fasc. 28, p. 75, synonymy.

Stibasoma pachycephalum Bigot 1892, Mem. Soc. Zool. France, 5:636, Mexico. Fairchild 1956, Smiths. Miscell. Coll., 131(3):25, types seen.

Stibasoma flavistigma Hine 1912, Ohio Nat., 7(7):516, ♀, Mexico.

Stibasoma bifenestrata Philip 1966, Ann. Ent. Soc. Amer. 59(2): 526, figs. 5, 12, ♀, Nicaragua.

A large robust reddish brown to blackish species with silvery white beard and palpi, legs black and black haired with silvery hair patches at the bases of the tibiae, wings distinctively patterned black and yellow, and abdomen above reddish to blackish with concolorous hairs, below reddish to yellowish with wide bands of yellow hairs.

Female. Length 15-18mm (N=12, \bar{x} =16.4mm). Frontal index 4.5-6.1 (\bar{x} =5.1). Frons reddish brown to black in ground color with sparse pale gray pollinosity and short sparse black hairs. Callus large, the basal portion touching the sides of the frons, extended upward

into a wide ridge nearly reaching the vertex. Subcallus, genae, and frontoclypeus silvery gray pollinose, rarely partly or wholly bare or black pollinose, the beard of numerous short pale silvery white hairs. Antennae black and black haired, the third segment somewhat inflated with a long dorsal tooth reaching past the first annulus. Palpi pale yellowish brown with sparse pale gray pruinosity and numerous silvery gray hairs. Proboscis with a dark brown pollinose rostrum and a shiny black labella.

Mesonotum, scutellum, pleura, and coxae reddish brown to black with sparse grayish pollinosity and short black hairs except for silvery white hair tufts on either side of the scutellum, in front of and below wing base, and basally on the coxae. Legs black and black haired except basal fourths of all tibiae which are pale yellow and silvery white haired. Wings patterned as figured, blackish with a yellow discal band and hyaline apex.

Abdomen reddish brown to black with numerous short black hairs except for small pale haired borders on tergites 6-7 and lateral pale hair patches on 1-3. Below all segments with broad yellow haired stripes.

Male. Fairchild states:

The male is quite different in appearance, the wing having a broad yellow band from costa to hind margin covering the basal and most of anal and axillary cells. The abdomen is yellow in ground color, with tergites 1 and 2 yellow-haired, 3 to 6 black-haired. Mesonotum chocolate brown, the scutellum reddish. Legs as in [♀]. Eyes with upper facets much enlarged, covering fully 2/3 of eye area, brown and sharply demarcated from the small facets. Antennae as in [♀], but more slender. Face and cheeks silvery pollinose, white-haired. Palpi oval, porrect, blackish. Proboscis with fully sclerotized labella. (Unpublished 1978)

Distribution. Mexico to Colombia (Valle, Cauca).

Material examined. Panama, 4^{♀♀} 1♂. Costa Rica, 2^{♀♀}. Belice, 1♀.
Colombia: Valle; Buenaventura, 1♀ 8 May 1942, J. Rodriguez B. coll;
Cauca; Guapi, CO₂ baited flight trap, 6^{♀♀} 10 May 1976.

Discussion (G. B. Fairchild pers. comm 1978). Osten Sacken's description says that the subcallus is black and shiny, but face silvery and palpi with mixed black and white hairs. Williston (1901) discussing another specimen from Tabasco, Mexico, mentions a minute median yellow spot on the hind borders of tergites 1 and 2. Philip (1966) separates his *Stibasoma bifenestrata* largely on the basis of its having silvery pollinose subcallus and white haired beard and palpi. Specimens from Colombia, Costa Rica and most of those seen from Panama agree with Philip's description. A Panama specimen from extreme western Panama, however, agrees closely with Osten Sacken's description and with the specimen in BM(NH) now labeled as type. A further specimen from Belice is darker, having a black shiny subcallus, black pollinose genae and frontoclypeus, black beard, and wholly black palpi. It also has the 2 small yellow haired spots on abdomen mentioned by Williston. Some of the Colombian specimens have a pale spot on tergite 1, though not on 2. It thus seems that there may be more variation than Philip recognized, and that Osten Sacken's type represents a somewhat intermediate specimen. In any case there seems as yet no reason to change the placement of *bifenestrata* Philip in Fairchild's catalogue (1971).

Stibasoma (Stibasoma) flaviventris (Macquart)

Tabanus flaviventris Macquart 1848, Dipt. Exot., Supp. 3, p. 11,
pl. 1, fig. 4, ♀, Rio Negro.

Stibasoma flaviventre: Krober 1934, Rev. Ent., 4(2):263, references. Fairchild 1956, Smiths. Miscell. Coll., 131(3):13, synonymy, type seen. Goodwin and Murdoch 1974, Ann. Ent. Soc. Amer., 67(1):112, figs. 21, 33.

Stibasoma stilbium Fairchild 1953, Ann. Ent. Soc. Amer., 46(2): 264-267, pl. 2, fig. 11, Panama; 1953, Proc. Ent. Soc. Washington, 55(5):241.

A medium to large robust black and golden yellow bee like species with a mostly bare subshiny black frons, long antennal tooth, and swollen black palpi. Thoracic and leg hairs black except for white haired tibial bases, wings deep black at the base, pale yellow costally, and pale brown apically and along anal margin. Abdomen above with tergite 1 dark haired, the remainder golden yellow and/or coppery haired.

Female. The original description of Fairchild (as *St. stilbium*) is reprinted below following these additional observations. Length 16-18mm (N=9, \bar{x} =17.3mm). Frontal index 4.4-5.4 (\bar{x} =5.0).

Eyes bare, in life dark blackish above, dull greenish below, the colors sharply separated along a line extending from the inner angle transversely across the middle of the eye, but less distinctly separated at the outer angle. Frons about 5.5 times as high as basal width, wholly black and black haired, the basal callus poorly marked, merging into a seamed and wrinkled median stripe which joins the poorly delimited vertical triangle. There is a weakly defined tubercle at vertex and vestiges of an anterior ocellus. Subcallus, frontoclypeus and genae shining pearl grey pollinose, changing from whitish to nearly black with changing light incidence, the last two rather densely beset with black hairs. Beard black. Antennae black, somewhat pearly pollinose, black haired except for some silvery hairs at base of first segment above. Dorsal tooth long, reaching beyond the first annulus with a tendency for its tip to be clubbed. Palpi quite strongly inflated, black and black haired. Proboscis black, less than head height and not much exceeding palpi, the theca and labella well sclerotized, the latter shiny.

Mesonotum and scutellum black to dark brown, dark brown pollinose, densely black haired. Pleura and sternum black and rather densely black haired. Legs black, black haired, except for a small patch of silvery white hairs on outside of base of each tibia. Fore tibiae markedly swollen, hind tibiae with both an external and internal fringe of long hairs, all legs quite densely hairy. Wings with subepaulet bare, costa and first vein setose above, subcosta with a single row of macrotrichiae above, densely setose below; venation normal, no appendix on third vein, first posterior cell (R_5) somewhat narrowed. Wings black at extreme base to the arculus, the rest deeply yellowish tinged fading to faintly dusky at apex; costal cell brown, and in some specimens a tendency for the centers of the cells to be more hyaline, so that the veins appear yellowish to brownish margined.

Abdomen dark reddish brown to nearly black in ground color, the first tergite wholly black haired or with a posterior fringe of sparse yellow hairs mixed with the black. Succeeding segments clothed with dense short shiny coppery red hairs basally, bright shiny yellow hairs on the posterior margins. The proportions of red and yellow hairs varies, some specimens having the tergites mostly yellow haired. In two specimens there is some admixture of black hairs with the coppery ones, and in all the fifth to last tergites are almost wholly yellow haired and much telescoped into the preceding segments. Beneath, the first sternite is black haired, the second with some yellow at sides of posterior margins, the remainder with increasingly complete and increasingly broad yellow haired hind margins, otherwise the sternites are black haired. (1953, pp. 264-266)

Male. The male is similar to the female in coloration. Eyes holoptic, upper two-thirds with large facets well differentiated and demarcated from the small ones below.

Distribution. Mexico to Brazil. Colombia (Valle).

Material examined. Panama, 4^{♀♀}₊ (including a paratype of *Stibasoma stilbium* compared to types of *T. flaviventris* and *T. dives* Walker by G. B. Fairchild). Surinam, 2♂♂. Mexico, 1[♀]. Honduras, 4^{♀♀}₊. No Colombian material seen by me.

Discussion. *S. flaviventris* is evidently predominantly arboreal. Fairchild (1953, unpublished 1978) cites collection records from Panama,

Honduras, and Mexico, all taken in or suspected as having been taken in the canopy. Lee et al. (1969) report 3^{♂♂} captured from human bait in the canopy in the Rio Raposo area on 27 Jan. 1964, 3 Feb. 1964, and 18 Nov. 1965. Goodwin and Murdoch (1971) reported larvae from arboreal bromeliads in Panama.

Stibasoma (Stibasoma) fulvohirtum

Tabanus fulvohirtus Wiedemann 1828, Auss. zweifl. Ins. 1:155, ♀, Brazil.

Stibasoma fulvohirtum: Fairchild 1940, Ann. Ent. Soc. Amer., 33(4):685, fig. 4, Panama, full references. 1951, Ann. Ent. Soc. Amer., 44(3):451. 1971, Cat. S. Amer. Dipt., Fasc. 28, p. 76, synonymy. Goodwin and Murdoch 1974, Ann. Ent. Soc. Amer., 67(1):114, figs. 21, 34.

A medium sized bee-like deep reddish brown species with yellow markings. Subcallus and face silvery pollinose, dorsal antennal tooth long, thorax black to orange red haired, legs tricolored yellowish brown, brown, and white, and abdomen with posterior yellow bands on at least tergites 2-3.

Female. Length 10-13mm (N=16, \bar{x} =11.7mm). Frontal index 4.3-5.5 (\bar{x} =4.7). Frons slightly convergent below, shiny blackish with sparse pollinosity laterally and golden yellow hairs on the borders, the remainder with numerous black hairs. The shiny, drop shaped callus blends with frons, and tapers to a thin ridge above three-fourths distance to vertex. Subcallus, genae, and frontoclypeus shiny silver pollinose with silvery white hairs on the upper genae and frontoclypeus and beard of long brown hairs. Antennal segments 1 and 2 silvery pollinose, black haired above, silvery haired below. Third segment

reddish brown with a long dorsal tooth reaching past first annulus. Palpi brown with numerous black hairs, inflated basally, and pointed apically. Proboscis shiny blackish brown, wholly sclerotized.

Mesonotum and scutellum blackish brown and either densely orange yellow haired or black haired with two white or pale yellow hair tufts just behind and below wing bases. Pleura and coxae dark gray pollinose with black or orange yellow hairs. Legs pale brown to black, vestiture of thick dark brown hairs except for white hairs on all tarsi, basal half of protibiae, all of mesotibiae, and basal fourth of metatibiae. Wings yellowish hyaline with apical margin and anal margin broadly pale brownish.

Abdomen above ranging from nearly completely blackish brown haired with sparse yellow haired bands on at least the posterior borders of tergites 2-3, to brown haired with broad yellow haired posterior margins on all tergites. Abdomen below in those with orange yellow thoracic hairs having yellow haired posterior margins and white haired in those with dark thoracic hairs.

Male. Not described.

Distribution. Costa Rica to Brazil. Colombia (Choco, Valle, Boyaca, Meta).

Material examined. Panama, 13^{♀♀} (including one compared to type of *Tabanus compactus* Walker and another to type of *T. fulvohirtus* Wiedemann). Costa Rica, 1[♀]. Trinidad 3^{♀♀}. Colombia: Choco; La Teresita, 1[♀] 3 Oct. 1967, D. G. Young coll.

Discussion. Bequaert and Renjifo (1946) report *S. fulvohirtum* from Boyaca, Guaguaqui and Meta, Villavicencio.

Evidently this is primarily an arboreal species. Lee et al. (1969) report 1[♀] captured at 18m coming to human bait in the Rio Raposo area on 22 June 1964. Fairchild (1953) reports that 76 of 80 taken in a survey in Panama were collected in the forest canopy. Goodwin and Murdoch (1974) collected 35 larvae of this species in terrestrial bromeliads in Panama, and were able to rear 20 to the adult stage.

Stibasoma (Stibasoma) panamensis Curran
(Fig. 77)

Stibasoma theotaenia panamensis Curran 1934, Fam. Gen. N. Amer. Dipt., p. 153, fig. 23, head, no description. Fairchild 1951, Ann. Ent. Soc. Amer., 44(3):451, fig. 3.

Stibasoma theotaenia var. *panamensis* Fairchild 1940, Ann. Ent. Soc. Amer., 33(4):685-686, Panama, full references.

Stibasoma panamensis Fairchild 1953, Ann. Ent. Soc. Amer., 46(20): 267, key.

A medium sized robust black and yellow species with a bare subcallus, black wings, black legs with reddish tarsi, and abdomen with at least tergites 1-2 yellow haired.

Female. Length 10-14mm (N=13, \bar{x} =12.3mm). Frontal index 4.0-6.3 (\bar{x} =4.9). Frons subshiny black. Callus slightly raised, black and drop shaped. Eyes black dorsally, pale gray below, the colors well demarcated. Subcallus shiny blackish brown. Genae, frontoclypeus, and palpi blackish brown in ground color with sparse gray pollinosity. Palpi covered with numerous black hairs, inflated basally and pointed. Antennal segments 1 and 2 shiny blackish brown and black haired. Basal plate of third segment inflated, the dorsal tooth long, reaching first annulus. Beard is of sparse dark brown hairs.

Mesonotum and scutellum dark reddish brown with sparse grayish pollinosity and numerous long black hairs in unrubbed specimens. A small tuft of white hairs in front of wing base. Pleura and legs dark reddish brown with some grayish pollinosity and black hairs. Tarsi reddish. Wings blackish, nearly hyaline at the apex and along anal margin.

Abdominal coloration varies geographically. Specimens from Honduras are yellow and yellow haired on tergites 1-2, the remainder coppery. The coloration of tergites 3-7 varies from coppery as noted above to tergite 3 blackish brown and 4-7 wholly black and black haired in examples from Choco. Below sternites 1 and 2 are black haired, sternite 2 with a yellow haired apical border and the remainder coppery red haired.

Male. Not known.

Distribution. Honduras to Colombia (Choco).

Material examined. Panama, 8^{♂♂} (including one compared to type of *Stibasoma theotaenia* Wied. and found not in agreement). Honduras, 2^{♂♂} Colombia: Choco; Curiche, 1[♀] 21 April 1967, 1[♀] 12 May 1967, D. G. Young coll.

Discussion. Fairchild (1953) reported that 7 of 9 captured during a study in Panama were taken in the forest canopy.

Stibasoma (Rhabdotylus) venenatus (Osten Sacken)

Tabanus venenatus Osten Sacken 1886, Biol. Centr. Americana, Dipt., 54, [♀], Guatemala, Panama.

Rhabdotylus venenatus: Stone 1944, Bol. Ent. Venez. 3(3):130, Venezuela. Fairchild 1956, Smiths. Miscel. Coll., 131(3):31, types

seen. Philip 1960, Proc. Calif. Acad. Sci., Ser. 4, 31(3):87, designates lectotype.

Stibasoma (Rhabdotylus) venenata: Fairchild 1971, Cat. Dipt. S. Amer., Fasc. 28, p. 77. Goodwin and Murdoch 1974, Ann. Ent. Soc. Amer., 67(1):114, figs. 21, 35.

Amphichlorops venanata: Krober 1934, Rev. Ent., 4(2):271.

A medium sized green to bluish green species with a long dorsal antennal tooth, moderately inflated palpi, tricolored yellowish green, silvery, and black legs, and abdomen green to blue green, sparsely black haired except for small middorsal yellow hair patches on tergites 2-3.

Female. Length 13-17mm (N=16, \bar{x} =15.4mm). Frontal index 3.5-4.4 (\bar{x} =3.8). Frons sparsely grayish yellow pollinose with numerous short dark hairs above. Callus large, yellowish brown, touching sides of frons at the base, tapering gradually above, nearly reaching vertex. Eyes unicolorous green in life. Subcallus genae, and frontoclypeus yellow pollinose. Antennal segments 1 and 2 yellowish brown with a mixture of dark and pale reddish yellow hairs. Basal plates of third segment somewhat swollen, pale reddish brown, the dorsal tooth long, reaching to first annulus. Palpi yellow with golden yellow hairs except for a few interspersed black hairs, most of them at the tip. Beard of golden yellow hairs. Proboscis with a brown pollinose rostrum and shiny black labella.

Mesonotum dull reddish brown with sparse grayish brown pollinosity and numerous short black and pale reddish yellow hairs. Scutellum pale grayish green. Pleura and coxae grayish yellow pollinose and golden yellow haired. Femora pale yellowish green. Basal three-fourths of

pro- and mesotibiae and basal fourth of metatibiae white and silvery white haired. Remainder of tibiae and all tarsi black. Wing with costal cell only tinted, the veins sometimes brown margined.

Abdomen above green to bluish green with sparse short black hairs, denser on tergites 4-7. On unrudded specimens there are small mid-dorsal pale yellow patches on tergites 2-3 as well as laterally on 3-5. Abdomen below evenly clothed with short yellow hairs.

Male. Not known.

Distribution. Guatemala to Ecuador. Colombia (Valle).

Material examined. Panama, 5^{♀♀}. Costa Rica, 3^{♀♀}. Ecuador, 3^{♀♀}. Venezuela, 1[♀]. Colombia: Valle; Lago Calima, from livestock, 1[♀] 8 Aug. 1975; Penas Blancas, from horses, 3^{♀♀} 23-30 Dec. 1974, 1[♀] 2 Jan. 1975, 1[♀] 12 March 1975, 1[♀] 20 March 1975, 2^{♀♀} 1 April 1975, 1[♀] 21 April 1975, 3^{♀♀} 5-15 May 1975, 1[♀] 11 Aug. 1975, 1[♀] 2 Sept. 1975.

Discussion. Fairchild discusses this and two other species, *S. viridiventr* Macquart and *S. planiventr* Wiedemann in his Tabanidae of Panama (unpublished 1978). The three species are quite similar but it appears of the 3 only *S. venenata* occurs in Panama and Colombia. In his discussion he mentions a different form of *S. venenata* which has pale yellow instead of orange hairs on the palpi, femora, pleura, and beard. I encountered the orange form at Penas Blancas and the single specimen from Lago Calima was the pale yellow variety.

Goodwin and Murdoch (1974) collected 25 larvae of this species in arboreal bromeliads in Panama, 2 of which were reared to the adult stage.

Genus *Cryptotylus* Lutz

Cryptotylus Lutz 1909, Inst. Osw. Cruz em Manguinhos, p. 29;
1913, Brazil Medico, 45:5. Fairchild 1969, Arq. Zool. Sao Paulo,
17(4):212. Philip and Fairchild 1956, Ann. Ent. Soc. Amer., 49(4):
313-324, figs. (as subgenus of *Chlorotabanus*).

Cryptotylus can be recognized by its overall green to orange or
brown coloration and frontal callus. It differs from the similar
Chlorotabanus in having antennae with a strong dorsal tooth or spine,
and vestiges of a frontal callus. The 4 described species are all
crepuscular and nocturnal; 2 of these occur in the area discussed here.

Key to *Cryptotylus* Species

1. Basal plate of third antennal segment broad, angled below,
the dorsal tooth not longer than its width at base. Vesti-
ture orange to dark rufous in females, pale yellow in males.
Fork of third vein rarely with a short appendix (Fig. 13N).
. *unicolor*
- 1'. Basal plate slender, not angled below, the dorsal tooth
longer than its width at base, slender. Vestiture generally
paler, yellow in both sexes. Fork of third vein nearly always
with a short to long appendix (Fig. 13M). *chloroticus*

Cryptotylus chloroticus Philip and Fairchild
(Fig. 13M)

Chlorotabanus (Cryptotylus) chloroticus Philip and Fairchild 1956,
Ann. Ent. Soc. Amer., 49(4):320-321, fig. 7.

Cryptotylus limonus: Fairchild 1940, Rev. Ent., 11(3):720-722,
fig. 5. Not Townsend 1897.

A medium sized robust yellowish species with basal plate of third antennal segment slender, with a long dorsal spine. Legs unicolorous yellowish, and wings dusky yellowish, the fork of third vein with an appendix.

Female. Length 11-14mm (N=11, \bar{x} =12.5mm). Frontal index 3.2-3.7 (\bar{x} =3.6). Frons parallel sided or slightly convergent below. This species is quite like *C. unicolor* but is generally smaller and paler yellowish, the basal plate is more slender, the dorsal tooth longer, and fork of third vein always with a distinct appendix.

Male. As female but slightly paler. Easily associated because of slender basal plate and appendix at fork of third vein.

Distribution. Panama, Trinidad, Colombia (Meta).

Material examined. Panama, 1♂, 5♀♀. Trinidad, 2♂♂, 5♀♀.
Colombia: Meta; Villavicencio, 1♀ 1 June 1942, W. H. W. Komp coll.

Cryptotylus unicolor (Wiedemann)

Tabanus unicolor Wiedemann 1828, Auss. zweifl. Ins. 1:141.

Cryptotylus unicolor: Fairchild 1940, Rev. Ent., 11(3):719-720, fig. 4, full references.

Chlorotabanus (Cryptotylus) unicolor: Philip and Fairchild 1956, Ann. Ent. Soc. Amer., 49(4):318-320, synonymy.

A medium to large robust reddish yellow species with basal plate of third antennal segment broad and angled below, legs unicolorous yellowish brown, and wings vaguely yellowish hyaline.

Female. Length 12-16mm (N=15, \bar{x} =14.5). Frontal index 3.2-4.1 (\bar{x} =3.7). Frons parallel sided or slightly convergent below, 0.8-1.0

as wide as vertex. Frons pale yellowish brown to reddish brown pollinose with short dark brown and pale yellow hairs, no tubercle or vestiges of ocelli at vertex. Callus not well defined, a pale yellow to brown thin ridge which is widened slightly below and a third as high as frons. Subcallus, genae, and frontoclypeus yellowish to reddish yellow pollinose with sparse yellowish hairs. Antennal segments 1 and 2 yellowish to yellowish brown and yellow haired; segment 3 broad yellowish brown or, less commonly, some specimens with green to blackish basal plate. Palpi yellowish to yellowish brown with numerous short yellow hairs; base quite swollen, apex pointed. Proboscis stout, wholly sclerotized, the theca yellowish, the labella darkly pigmented; length about half again that of palpi. Beard of short yellow hairs.

Mesonotum and scutellum yellowish brown to reddish yellow, paler laterally; vestiture mostly of numerous short yellow hairs with some black hairs intermixed. Pleura and coxae pale yellow to yellowish brown pollinose with yellowish hairs, most numerous below wing. Legs yellowish brown to pale reddish yellow, yellowish haired, the tarsi slightly darker. Wings hyaline, faintly pigmented yellowish brown to greenish along costal margin. Fork of third vein sometimes with a very small appendix.

Abdomen above yellowish brown to dark reddish brown with numerous very short yellowish and black hairs. Below abdomen darker than above with sparse bluish pruinosity and yellowish hairs.

Male. Easily associated with female by the similar antennae. Overall coloration is paler however, pale yellow to pale brownish yellow. Eye with large facets on upper two-thirds well demarcated from much smaller facets below.

Distribution. Panama to Brazil (Mato Graso). Colombia (Choco, Meta).

Material examined. Panama, 2♂♂, 3♀♀. Surinam, 1♂, 2♀♀. French Guiana, 1♀. Venezuela, 1♀. Trinidad, 2♀♀. Brazil, 1♂, 2♀♀.

Discussion. *C. unicolor* was not taken by me during this study and I have but 1 report of its occurrence in Choco by D. G. Young (pers. comm. 1976). Bequaert and Renjifo (1946) report it from Meta; Hacienda Yacuana near Villavicencio.

Fairchild (unpublished 1978) states both sexes were taken in light traps in Panama, and the females from horses and cattle, apparently man is not a common host. Dunn (1934) reared adults from larvae taken from fresh water swamps in association with water lettuce (*Pistia stratiotes*). Males of *Cryptotylus* spp. can be told from the very similar males of *Chlorotabanus inanis* by the presence in *Cryptotylus* of a thin wafer like tubercle, without vestiges of ocelli, sunk between the eyes at vertex. *Chlorotabanus* males lack this structure.

Genus *Philipotabanus* Fairchild

Philipotabanus Fairchild 1942, Ann. Ent. Soc. Amer., 35(4):453
(*Tabanus* subgenus); 1964, J. Med. Ent., 1(2):179.

Philipotabanus is characterized by usually distinctly marked wings, an often quite narrow frons with a slender callus, vertex with a tubercle, usually slender palpi, and unpatterned, unicolorous eyes. Twenty-four species in 3 subgenera are recognized, 10 species representing all 3 subgenera were encountered in the study area, 2 of which are new.

The subgenera are characterized in the generic key.

Key to *Philipotabanus* Species

1. Small slender species, the uniformly smoky wings longer than body. Thorax unstriped, yellowish brown. Abdomen indistinctly banded (Fig. 8P-R). (*Mimotabanus*) *tanypterus* n. sp.
- 1'. Without the above combination of characters 2
- 2(1'). Wings with an irregular dark pattern of variable extent which always leaves clear areas surrounding all crossveins and fork of third vein. Palpi slender. Eyes bronze in life. Always rather slender long-winged species; wings nearly as long as or equalling body length. Frons narrow, index always greater than 7.0. 3
- 2'. Wings ranging from almost wholly blackish to hyaline with a small dark area below stigma, but crossveins and fork of third vein not surrounded by clear fenestra when included in dark pattern. Frons generally broader, except for *eriton*, always less than 7.0 5

- 3(2). Abdomen with a row of small middorsal white haired triangles.
 Legs pale yellowish brown (Fig. 79)
 (*Philipotabanus*) *pterographicus*
- 3'. Abdomen with at most a single middorsal pale haired mark.
 Legs with at least femora brown to black. 4
- 4(3'). Antennal basal plate pale yellowish brown, the annuli contrastingly dark. Legs wholly dark brown. Length 7-9mm. Abdomen dark brown, the first segments paler (Fig. 82).
 (*Philipotabanus*) *magnificus*
- 4'. Antennal basal plate and annuli dark brown to black. Meso- and metatibiae and tarsi pale yellowish white but not greatly contrasting with the other leg segments. Length 9-12mm.
 Abdomen blackish with sparse blue-black pruinosity (Fig. 81)
 (*Philipotabanus*) *nigrinubilus*
- 5(2'). Mesonotum blackish brown with the scutellum contrastingly silver gray pollinose and silver gray haired. The fourth abdominal tergite with a broad silver gray haired triangle usually reaching preceding segment. Discal wing band extending beyond fork of third vein (Fig. 83)
 (*Mimotabanus*) *vulpinus*
- 5'. Without the above combination of characters 6
- 6(5'). Mesonotum brown to blackish brown with lateral and sublateral pale yellow to gray stripes. Wings with only a faint smoky brown discal patch (Fig. 80). (*Mimotabanus*) *porteri*
- 6'. Mesonotum without distinct stripes. Wings distinctly marked. . 7
- 7(6'). Wing either entirely blackish or discal band broad reaching beyond fork of third vein leaving the apex hyaline. 8

- 7'. Wing with less extensive markings, a small basal area and discal band not reaching fork of third vein 9
- 8(7). Wing nearly entirely blackish with at most small hyaline spots at the apices of the basal cells and rarely small hyaline spots in other cells (Fig. 84). (*Melasmatabanus*) *nigripennis*
- 8'. Wing black except for clear-cut hyaline areas at the wing apex and at the apices of the basal cells (Fig. 78).
 (*Melasmatabanus*) *fascipennis*
- 9(7'). Discal band small reaching slightly beyond discal cell, the apex of the wing lightly infuscated, leaving a series of whitish spots next to the discal border of the dark band. Abdomen with at most a small middorsal pale grayish hair patch on tergite 4. Frons very narrow, index 9.0. Callus thread-like (Fig. 85). (*Melasmatabanus*) *eriton*
- 9'. Discal band as above but wing without apical infuscation. Abdomen with a distinct silvery white hair triangle on tergite 4 reaching or nearly reaching the preceding segment (Fig. 86) (*Mimotabanus*) *phaleropygus*

Philipotabanus (*Melasmatabanus*) *eriton* (Krober)
 (Fig. 85)

Phaeotabanus columbianus Krober 1931, Stett. Ent. zeit., 92:90-91,
 ♀, Colombia. Not Enderlein 1925.

Tabanus (*Phaeotabanus*) *eriton* Krober 1934, Rev. Ent., 4(3):304,
 nom, nov. Fairchild 1975, Proc. Ent. Soc. Washington, 77(2):260.

Tabanus (*Philipotabanus*) *keenani* Fairchild 1947(1946) Ann. Ent. Soc. Amer., 39(4):574, fig. 2, ♀, Panama. 1953, Ann. Ent. Soc. Amer., 46(2):278, ♂, Colombia.

A small to medium brownish species with a very narrow frons, orange yellow antennae, unicolorous dark legs, wings with a brown discal band and brown basal halves of basal cells, and abdomen blackish brown with an indistinct middorsal pale hair tuft on tergite 4.

Female. Length 8-11mm (N=7, \bar{x} =9.4mm). Frontal index 6.1-9.0 (\bar{x} =7.6). Frons convergent below, 0.7-0.86 as wide as vertex. Frons grayish brown pollinose, subshiny blackish brown at vertex with indistinct vestiges of ocelli. Callus blackish brown, thin and club shaped, about half as wide as frons at base, reaching two-thirds height of frons. Eyes bare, color not noted. Subcallus brown pollinose, genae and frontoclypeus grayish brown pollinose. Antennal segment 1 grayish brown pollinose, segment 2 yellow orange, both dark brown haired; segment 3 yellow orange, the basal plate flattened and broad, about 2 times longer than wide, the dorsal tooth obtuse and not well developed. Palpi grayish black with numerous short dark hairs, only slightly expanded basally and bluntly pointed. Proboscis blackish brown and wholly membranous. Beard of sparse short brown hairs.

Mesonotum brown to dark brown, vestiture of numerous short black hairs with sparse yellowish hairs intermixed. Scutellum brown or dark brown and dark haired anteriorly and paler with dull yellowish hairs posteriorly. Pleura and coxae dark brown covered with grayish pollinosity and dark brown hairs. Other leg segments dark brown and dark haired. Basicosta with setae as dense as on adjoining costa. Wings patterned brown, as figured.

Abdomen dark brown with mostly short black hairs except for small white hair patches laterally on tergites 2 and 3, middorsally on

tergite 4, and a fringe along posterior borders of sternites 2 and 3. Above there is sparse bluish gray pruinosity on all of segments 1 and 2 and posteriorly on 3; below wholly sparsely pruinose.

Male. As female. Holoptic, facets on upper two-thirds large, bare, well differentiated and demarcated from the lower small facets. No tubercle at vertex. Antennae more slender than female. Palpi porrect and sausage shaped with long brown hairs. Mesonotal hairs much longer than in female.

Distribution. Panama, Ecuador, Colombia (Choco, Santander, Antioquia, Valle, Cundinamarca).

Material examined. Panama; 1♂ 2♀♀. Ecuador, 1♂ 2♀♀. Colombia: Choco; Curiche River, 1♀ 1 Aug. 1967, D. G. Young coll; Santander; San Vicente, in tree tops, 1♀ 4 Dec. 1955, J. Boshell coll.

Discussion. Colombian records in the literature include the type locality of Fusagasuga (Cundinamarca), Rio Suarez (Santander) (Fairchild 1953), and a male from Rio Raposo (Valle) (Lee et al. 1969). In addition Porter (pers. comm. 1976) reports it from the Providencia region of Antioquia.

Philipotabanus (Melasmatabanus) fascipennis (Macquart)
(Fig. 78)

Tabanus fascipennis Macquart 1845, Dipt. Exot. Suppl. 1:35, pl. 4, fig. 1, ♀.

Tabanus (Philipotabanus) fascipennis: Fairchild 1943, Ann. Ent. Soc. Amer., 35(4):462, fig. 19, ♀.

Philipotabanus fascipennis: Fairchild 1958, Ann. Ent. Soc. Amer., 51(6):529, full references.

A medium sized species with a yellowish brown thorax, unicolorous black legs, wing blackish except for a small hyaline discal band covering apices of basal cells and hyaline apex of wing. Abdomen blackish with a white haired middorsal triangle on tergite 4.

Female. Length 11-12.5mm (N=6, \bar{x} =11.7mm). Frontal index 5.1-6.8 (\bar{x} =6.0). Frons parallel sided, grayish yellow pollinose with short black hairs. Area at vertex subshiny blackish, no raised ocellar tubercle present but 3 distinct vestigial ocelli present. Callus blackish brown, not touching sides of frons, drop shaped, gradually narrowed above to a fine point. Eyes bare, bright green in life. Subcallus and genae yellowish brown pollinose, frontoclypeus yellowish gray pollinose. Vestiture short pale brown hairs on upper genae and upper frontoclypeus, the beard of sparse brown hairs. Antennal segments 1 and 2 pale yellowish brown with black hairs; basal plate yellowish orange, the dorsal tooth with a 90° angle; annuli dark brown. Palpi grayish black with numerous short black hairs; base somewhat swollen, the ends pointed. Proboscis wholly blackish brown pollinose, half again as long as palpi, labella large, half length of proboscis.

Mesonotum and scutellum yellowish brown, vaguely striped darker on the midline and along longitudinal sutures. Vestiture of numerous short erect black hairs and recumbent shiny yellow hairs. Pleura yellowish brown around wing base, the remainder including meso- and metacoxae bluish gray pollinose. Pleural vestiture of numerous slender dark brown hairs. Procoxae grayish black pollinose and dark haired. Other leg segments blackish and dark haired. Basicosta with about 10 short setae. Wing blackish as figured with a small hyaline basal spot, discal band, and apical spot.

Abdomen above blackish with blue gray pruinosity and numerous short black hairs except for a middorsal white hair patch on tergite 4 about half as wide and a third as tall as segment and lateral white patches on tergites 1-3. Abdominal sternites blackish with short black hairs, the borders of 2-5 with a few white hairs.

Male. Easily associated with female. Holoptic, upper three-fifths with short pilose large tan facets in preserved specimen; small facets below well differentiated and demarcated. Tubercle at vertex vertical, reaching to level of eye. Antennae of same coloration but more slender than in female. Palpi porrect, sausage shaped, pale gray with long brown hairs, about 3 times longer than wide. Hairs on mesonotum as female but the dark hairs much longer and more slender, the yellow hairs less numerous. Anteriorly scutellum is yellowish brown with brownish hairs posteriorly, yellow with yellowish hairs. Wings marked as female. Abdomen dark brown with pale grayish pruinosity above. Below abdomen dark brown with pale blue gray pruinosity. Otherwise abdomen as female.

Distribution. Panama, Venezuela, Colombia (Antioquia, Valle).

Material examined. Panama, 2♀♀. Venezuela, 1♀. Colombia: Boyaca; Muzo, 1♀; Valle; Lower Anchicaya, netted, unbaited and CO₂ baited flight trap, 1♀ 10 Aug. 1973, 1♀ 26 Jan. 1976, 1♂ 2♀♀ 5 March 1976; 41km E and 20km N Buenaventura, CO₂ baited flight trap, 1♀ 19 March 1976.

Discussion. The specimens described here match Macquart's (1845) description and Kroeber's (1930b) drawing of the wing.

Philipotabanus (Melasmotabanus) nigripennis n. sp.
(Fig. 84)

A medium sized species with a yellowish thorax and unicolorous black legs. Wings wholly blackish brown and abdomen blackish with a white haired middorsal triangle on tergite 4 and sometimes a less distinct triangle on tergite 3.

Female. Length 13mm; of wing 13mm. Frontal index 5.0, *Ph.* *nigripennis* is identical to *Ph. fascipennis* except the thorax is slightly more yellowish, the wing is nearly completely blackish and in some specimens, but not the holotype, abdominal tergite 3 also has a white hair patch. Eyes are metallic dark green.

Male. Not known.

Distribution. Ecuador, Colombia (Choco, Valle).

Material examined. Colombia: Holotype, ♀, Valle, 8km below dam Lago Calima, 1250m netted, 24 May 1976, R. Wilkerson coll. Paratypes; Choco; between Rio San Juan and Rio Baudo, netted, 1♀ 23 Feb. 1976; Valle; Rio Blanco, 1450m, 1♀ 19 Feb. 1970, W. Eberhard coll; Lago Calima, 8km below dam, from livestock, netted, and in CO₂ baited flight traps, 1♀ 8 Aug. 1975, 4♀♀ March 1976, 4♀♀ April 1976; Rio Bravo - Playa Rica, 15km below dam at Lago Calima, livestock 1♀ 19 Dec. 1975, 1♀ 2 Jan. 1976; Lower Anchicaya, CO₂ baited flight trap, 1♀ 5 March 1976.

Discussion. Lengths of paratypes 11-14mm (N=14, \bar{x} =12.4mm). Frontal indices 5.1-6.3 (\bar{x} =5.7). The figure of the wing is not the holotype and differs only by being somewhat paler. All specimens have faint spots at the apices of the basal cells while some have quite small spots in the centers of most other cells.

The example from Lower Anchicaya differs from the others by having predominately shiny yellow mesonotal hairs, and a brown abdomen with distinct white haired triangles on tergites 3 and 4.

Ph. nigripennis, as stated, is identical to *Ph. fascipennis* except for wing pattern. It apparently differs also from *Ph. (Melasnotabanus) fascipennis ecuadoriensis* (Krober) only in wing pattern. Krober's illustration of the wing of *ecuadoriensis* shows a dark base, smaller hyaline area at the apices of the basal cells, and a smoky apex. Fairchild (1975) placed it as a subspecies of *fascipennis*.

Philipotabanus (Mimotabanus) phalaropygus Fairchild
(Fig. 86)

Philipotabanus (Mimotabanus) phalaropygus Fairchild 1964, Jour. Med. Ent., 1(2):169-185, fig. 11, ♀, Panama.

The following is the original description of Fairchild.

A rather stout black species with a square black discal patch on wings and a prominent yellowish white triangle on tergite 4.

♀. Length 13.5mm; wing 11.5mm. Eyes bare, apparently unicolorous. Frons about 4.5x as high as wide, nearly parallel sided, grey pollinose. Frontal callus dark brown, nearly black, narrowed above into a slender ridge reaching nearly to vertex. Vertex with a slightly raised triangular bare patch with faint vestiges of ocelli. Subcallus brown, greyish pollinose, with numerous scattered dark grey erect hairs to margin of subcallus, becoming denser and longer on lower genae, but absent on lower part of frontoclypeus.

Antennae orange, segments 1 & 2 grey pollinose, black-haired, 3 broad, with a strong dorsal angle on basal plate; style concolorous, over 1/2 length of plate. Palpi black, rather inflated basally, blackish pollinose and black-haired. Proboscis black, pollinose, labella membranous, over 1/2 length of proboscis, mandibles and maxillae only slightly longer than palpi.

Mesonotum black, subshiny, with faint reddish sutural lines, sparsely black-haired with exception of a few

orange brown hairs on anterior border and whitish hairs on pronotal lobes. Scutellum and pleura blackish, black-haired. Legs all black and black-haired, fore tibiae slightly reddish on basal 1/3. Hind tibiae with a fringe of longer hairs on outer surface. Wings with basicosta bearing scattered setae, base of costal vein grooved, venation normal, no appendix on fork of 3rd vein. Wings hyaline with a black patch below stigma including all of discal cell and extreme bases of posterior cells. Costal cell and basal halves of basal cells lighter brownish, as are anal cell and axillary area. Halteres brown basally; knob yellowish white.

Abdomen above black, rather densely black-haired except for patches of yellowish white hairs on postero-lateral angles of tergites 1-3, and a large triangular patch of yellowish white hairs on hind margin of tergite 4. Pollinosity beneath lateral pale hair patches on tergite 2 and median patch on tergite 4, whitish, elsewhere blackish. Beneath the sternites are blackish, hind margins paler, those of sternites 2-4 fringed with white hairs behind. (1964, p. 177)

The specimen from Colombia differs slightly from the above description by having a narrower frons than those from Panama and the one from Peru (5.4 vs 3.7-4.7 respectively) and by having a paler discal band, the center of the discal cell pale and the basal cells wholly hyaline. Because of the hyaline basal cells this specimen can not be identified utilizing Fairchild's 1975 key.

Male. Specimen from Cali, Colombia, matches the above description of the female and varies in wing marking as do the females from Colombia. Large eye facets occupy upper two-thirds, are pale yellow, and densely pilose. Small facets with some short pilosity are well demarcated and much smaller than those above. Tubercle at vertex distinct and vertical. Antennae broken, basal plate of one remaining on a slide appears similar to the female. Palpi dark grayish brown, porrect, sausage shaped and slightly curved.

Distribution. Panama, Peru, Colombia (Valle).

Material examined. Panama, 3♂♂. Peru, 1♀. Colombia: Valle;
Rio Pance near Buenos Aires, 1200m, 1♀ 18 July 1970, W. Eberhard coll;
Cali, 1♂ 17 July 1975.

Discussion. Fairchild (unpublished 1978) reports the Panamanian
holotype and paratype to have been captured in the forest canopy
attracted to human bait.

Philipotabanus (Mimotabanus) porteri Fairchild
(Fig. 80)

Philipotabanus (Mimotabanus) porteri Fairchild 1975, Ann. Ent. Soc.
Amer., 68(4):692, pl. I, fig. 3, pl. II, fig. 6.

Stenotabanus sp. near *plenus* Lee, Fairchild and Barreto, 1969,
Caldasia, 10:451.

A small to medium brown to blackish brown species with wholly
dark legs, dark third antennal segment, a striped mesonotum, and wings
with a faint discal patch.

Female. Length 9-11.5mm (N=20, \bar{x} =10.5). Frontal index 3.7-4.8
(\bar{x} =4.4). Frons convergent below, 0.75-0.91 as wide as vertex. The
following is the original description of Fairchild

Eyes bare, unpatterned, reddish brown in life becoming
black in dried specimens. Frons silvery pollinose, the
callus dark brown, the tubercle at vertex black with
vestiges of ocelli. Short black semi-decumbent hairs
occur at and below vertex, and there is a postocular
fringe of short whitish hairs. Subcallus concolorous
with frons, without hairs. Frontoclypeus and genae
silvery gray pollinose, the latter with sparse brown
beard. Antennae with the first 2 segments orange, black-
haired above, pale-haired below. Third segment black
except for a small dull orange patch at extreme base.
Palpi dark gray pollinose, wholly black-haired. Proboscis
with labella large, black, wholly membranous and polli-
nose, slightly exceeding palpi in length.

Mesonotum blackish with a pair of fairly prominent
dorsal pale pollinose stripes and lateral margins

including notopleural lobes also pale pollinose. Hairs are short, semi-erect, mostly black, but with a few brassy hairs on the pale stripes. Scutellum blackish, with a paler and pale-pollinose hind border; hairs dense, short and black anteriorly, longer and pale on posterior border. Legs entirely black and black-haired, except coxae, which are grayish pollinose and pale haired. Pleura dark gray pollinose, mostly black-haired, but tufts of gray hairs on pronotal lobes and beneath halteres. Halteres black with contrasting yellow head. Basicosta acutely pointed, with a few black setae. Wings with venation normal, no appendix at fork of 3rd vein, glass clear in basal cells, elsewhere very faintly brownish, and with diffuse faint dark discal patch below brown stigma. This patch fairly well defined proximally, its margin crossing ends of basal cells, while distally fading imperceptibly into the faint brownish color of the distal half of wing.

Abdomen dark brown in ground color, the first 2 tergites pale gray pollinose and pruinose, the remainder black with pale narrow hind margins. Hairs black, except for small silvery middorsal broad triangles on tergites 2 to 5, smallest on 2, and small silvery hair patches on lateral posterior corners of tergites 1 to 4. Beneath all sternites are black basally with broad pale hind margins, black-haired basally, white-haired on posterior margins. (1975a, p. 692)

The material collected by me from Colombia shows some variation not noted above. Thoracic coloration is fairly uniform but the abdominal ground color varies from yellowish brown to blackish with the last segments darker. Below the abdominal hairs are black as described in the dark specimens but either a mixture of dark and light hairs or wholly pale haired in the paler specimens. Abdominal triangles are often rubbed or indistinct.

Male. Not known.

Distribution. Colombia (Antioquia, Valle).

Material examined. Colombia: Antioquia; (Paratypes) Rio Anori Valley, La Tirana, 570m, 1♂ 22 May 1971, 2♀♀ 19-23 June 1971; Valle; Rio Raposo (Paratype), 1♂ 31 July 1962, leg. V. H. Lee; 41km E and 20km

N Buenaventura, CO₂ baited flight trap, 1♀ 22 Nov. 1975, 1♂ 5 Dec. 1975, 10♀♀ 19 March 1976; Rio Bravo - Playa Rica, 15km below dam Lago Calima, from livestock, 1♀ 19 Dec. 1975; Rio Zabaletas, netted and CO₂ baited and unbaited flight traps, 2♀♀ 3 June 1975, 8♀♀ 18 Aug. 1975, 32♀♀ 19 Oct. 1975.

Philipotabanus (Mimotabanus) tanypterus n. sp.
(Fig. 8P-R)

A small pale yellowish brown species with unicolorous brown legs, long, wide wings, and abdomen above with tergites 1 and 2 yellowish and yellow haired, the remainder anteriorly brown and brown haired, posteriorly yellowish and yellow haired.

Female. Length 8mm; of wing 9mm. Frons, palpi, and antennae as figured. Frontal index 5.1. Frons grayish yellow pollinose with sparse short yellowish hairs. Ocellar tubercle and callus blackish brown. Vestiges of ocelli present. Eyes bare, color or pattern not noted. Subcallus yellowish brown pollinose. Genae and frontoclypeus grayish yellow pollinose, the beard a mixture of sparse yellowish and brown hairs. Antennal segments 1 and 2 pale yellowish brown pollinose with brown hairs. Segment 3 yellow orange with a few dark hairs. Palpi grayish yellow pollinose and dark brown haired. Proboscis wholly brown pollinose, the labella fleshy, large, about as long as palpi.

Mesonotum brown pollinose, indistinctly striped yellowish brown pollinose along longitudinal sutures and laterally. Vestiture mostly rubbed, remaining hairs a mixture of short golden yellow and dark brown. Scutellum brown pollinose, dark brown haired. Pleura and coxae brown in ground color covered with pale grayish yellow pollinosity and sparse pale yellow hairs. Other leg segments dark brown and dark brown haired.

Halteres with base of stem pale yellowish brown, the remainder brown. Basicosta bare. Wings relatively long and wide, color vaguely smoky with pale brown veins and stigma.

Abdominal tergites 1 and 2 pale yellowish brown, pale yellow pollinose and covered with pale yellow hairs. Tergite 1 vaguely darker mesially. The remaining tergites brown and brown pollinose with pale yellow posterior borders. Mesially the pale areas broaden slightly to form poorly defined triangles. Vestiture of tergites 3-7 primarily of brown hairs on the dark areas with some pale yellowish hairs intermixed and pale yellow hairs on the pale areas.

Abdomen below pale yellowish brown, pale yellow pollinose and pale yellow haired on sternites 1 and 2. Remaining sternites brown and brown haired with narrow pale yellow pale yellow haired posterior borders.

Male. Not known.

Distribution. Colombia (Valle).

Material examined. Colombia: Holotype, ♀, Valle, near Santa Maria, 2000-2500m, flight trap, 25 June 1975, R. Wilkerson coll. Paratypes, 1♂ same data as above; Valle; 8 km below dam at Lago Calima, flight trap, 1♀ 25 July 1975, R. Wilkerson coll.

Discussion. Both paratypes agree well with the above discussion although the specimen from Lago Calima is rubbed and the faint abdominal triangles are not evident. Lengths of the paratype specimens are 7 and 8mm. Frontal indices are 4.0 and 4.8.

Ph. tanypterus is closest to *Ph. grassator* Fairchild. At present *grassator* is considered a synonym of *Ph. stigmatalis* (Krober) (Fairchild 1971), but the specimens before me suggest that both may

be valid species. Comparison is made here with 2 specimens from Panama identified as *Ph. grassator* by G. B. Fairchild.

Tanypterus and *grassator* are both small, yellowish brown species without unusual markings, unicolorous legs, and relatively large wing. *Grassator* differs from the above description by having a narrow frons with a thin ridge like callus, a poorly defined ocellar tubercle, wings with a brown stigma and faint smoky patch below it, and while abdominal tergites 1 and 2 are pale yellowish it lacks the borders on the remaining tergites.

It is with some doubt that I place this species in *Philipotabanus* since it is unlike most species of that group by having unmarked wings, and a completely bare basicosta. Assignment to a subgenus is equally tenuous but it most fits with *Mimotabanus* because of the relatively broad frons and stouter palpi. It however does not have a clavate callus nor any pattern on the wing.

The name means "long wing" referring to this salient feature.

Philipotabanus (Mimotabanus) vulpinus Fairchild
(Fig. 83)

Philipotabanus (Mimotabanus) vulpinus Fairchild 1975, Ann. Ent. Soc. Amer., 68(4):690, pl. 1, fig. 1. ♀ ♂, Rio Raposo and Anchicaya, Colombia.

Philipotabanus sp. Lee et al. 1969, Caldasia, 10:452.

The following is the original description of Fairchild.

A black species with large black discal wing patch, bright silver-haired scutellum, and large silver white triangle on fourth abdominal tergite.

Female. Length 13mm, of wing 12mm. Eyes bare. Frontal index 4.7. Frons pale gray pollinose, callus black. Subcallus bright silvery gray, frontoclypeus and

genae darker gray, beard blackish. First and 2nd antennal segments dark brown, pale pollinose, black-haired. Third antennal segment reddish brown, lighter at base, blackish on distal half, style black. Palpi dark gray pollinose, black-haired. Proboscis black, labella wholly membranous.

Mesonotum black or very dark brown, dark gray pollinose, black-haired except for a pair of short indistinct rufous-haired stripes anteriorly. Scutellum white pollinose and densely silver white-haired. Pleura dark brownish gray pollinose, dark-haired except for a tuft of white hairs above the metathoracic spiracle. Legs wholly black and black-haired, except coxae which are somewhat brownish. Wings with large black patch filling discal cell and bases of marginal, submarginal and posterior cells, not distinguishable from wing of *fucosus* Fchld. (1958).

Abdomen dorsally black and black pollinose except sides of first and second tergites bluish gray pruinose when viewed from behind, and median broad white pollinose triangle on fourth tergite. Hairs black except on sides of 1st and 2nd tergites and median triangle, where they are silvery white. Abdomen beneath dark gray pollinose, black-haired, but hind margins of segments 2-6 are paler, with silvery white hairs, sparse on 6th segment, most abundant on 2nd, giving a prominently banded appearance to venter.

Male. Length 14mm, of wing 12mm. Eyes with upper enlarged facets densely short pilose, well differentiated and demarcated from small facets, occupying over half eye area. Lower facets bare. A small slender tubercle between eyes at vertex. Antennae more slender than in female. Coloration and vestiture as in female, but mesonotum with more extensive and longer yellowish hairs on anterior third and long yellowish hairs on hind margin. (1975a, p. 690)

Distribution. Colombia (Valle).

Material examined. Colombia: Valle; Rio Raposo, (holotype)

♀ 30 July 1963, Lee and Barreto colls; Lower Anchicaya, netted and CO₂ baited flight trap, 400m, 4♂♂ 5 March 1976.

Discussion. The holotype was taken at a tree station 13m above ground level, and the species may be arboreal, as its close relative *Ph. (M.) inauratus* appears to be in Panama.

Philipotabanus (Philipotabanus) magnificus (Krober)
(Fig. 82)

Tabanus (Phaeotabanus) formosus Krober 1930, Zool. Anz. 86:299, fig. 21, ♀, Ecuador. Not *T. formosus* Wlk. 1848.

Tabanus (Phaeotabanus) magnificus Krober 1934, Rev. Ent. 4(3):305. Ecuador, Costa Rica, Colombia. New name for *T. (Ph.) formosus* Krober 1930 not Walker 1848.

Tabanus (Philipotabanus) magnificus: Fairchild 1942, Ann. Ent. Soc. Amer., 35(4):456-458, pl. 2, fig. 13, ♀, Panama. Fairchild 1953, Ann. Ent. Soc. Amer., 46(2):278, ♂.

A small dark yellowish brown to blackish brown species, antennae usually pale with dark annuli, legs blackish brown, darker than pleura, and wings infuscated dark brown in a broad discal band which leaves clear areas around crossveins, at fork of third vein, and end of discal cell.

Female. Length 7-9mm (N=20, \bar{x} =8.05mm). Frontal index 7-11 (\bar{x} =8.8). Frons convergent below, 0.7-0.8 (\bar{x} =.73) as wide as vertex. Frons dirty grayish yellow pollinose with sparse very short dark hairs. Ocellar tubercle quite small with vestiges of three ocelli present. Area above tubercle subshiny dark brown. Callus blackish brown, narrow, not touching sides of frons, tapering gradually in a small ridge nearly reaching the tubercle. Eyes unbanded bronzy in life. Subcallus yellowish brown pollinose. Genae and frontoclypeus dirty grayish yellow pollinose. Antennal segments 1 and 2 yellowish with dark brown hairs; segment 3 with the basal plate orange yellow, about half again as long as high, the dorsal angle above obtuse; annuli usually contrastingly dark brown. Palpi dirty grayish brown with short

dark hairs, slender but somewhat swollen basally and bluntly pointed. Proboscis grayish brown pollinose, wholly fleshy, about half again as long as palpi. Beard of quite sparse short dark hairs.

Mesonotum and scutellum yellowish brown to dark brown with numerous short dark hairs. Pleura and coxae grayish yellow, mostly with sparse dark hairs except for a patch of pale yellow hairs below wing base. Legs dark brown and dark haired. Basicosta with a few small setae. Wing patterned dark brown as figured.

Abdomen yellowish brown to blackish brown with quite sparse bluish pruinosity, the first two segments usually paler. Vestiture above is of numerous short dark hairs, except for a few pale whitish hairs laterally on tergites 1-3 and on some specimens quite small middorsal pale hair patches on tergite 4, more rarely on 2 and 3. Sternites 2-4 with slightly paler borders, vestiture mostly of brownish hairs but the posterior borders of 2-4 with sparse whitish hairs.

Male. Easily associated with female. Eyes contiguous, upper three-fifths of large facets well demarcated from the small facets below. Palpi porrect about twice as long as wide with long black hairs. Thoracic vestiture with same coloration but longer than in female.

Distribution. Guatemala to Ecuador. Colombia (Choco, Valle, Antioquia, Santander, Meta).

Material examined. Guatemala, 1♂. Honduras, 2♀♀. Costa Rica, 5♀♀. Panama, 12♀♀. Ecuador, 1♂. Colombia: Choco; between Rio San Juan and Rio Baudo, most netted, some from CO₂ baited flight trap, 42♀♀ 23 Feb. 1976; La Teresita, 1♂ 24 Sept. 1967, D. G. Young coll; Curiche, 1♂ 20 April 1967, D. G. Young coll; Rio Nimiquia, 1♂ 22 Aug.

1942; Valle; Rio Zabaletas, most netted some in CO₂ baited and unbaited flight traps and a few from a CDC light trap, 88^{♀♀} 3 June 1975; 15^{♀♀} 1♂ July 1975, 8^{♀♀} 18 Aug. 1975, 2^{♀♀} 19 Oct. 1975; Lower Anchicaya, most netted, some from flight traps, 1[♀] 10 Aug. 1973, 35^{♀♀} Jan. 1975, 56^{♀♀} 1♂ June 1975, 12^{♀♀} Aug. 1975, 5^{♀♀} 26 Jan. 1976, 24^{♀♀} 1♂ 5 March 1976; Bajo Calima, 26^{♀♀} 5 Sept. 1975; Rio Bravo - Playa Rica, 15km below dam Lago Calima, 2^{♀♀} 19 Oct. 1975, 1[♀] 3 Feb. 1976, 1[♀] 26 March 1976; Lago Calima, 8km below dam, 1[♀] 26 March 1976; 41km E and 20km N Buenaventura, netted and CO₂ baited flight trap, 21^{♀♀} 22 Nov. 1975; 3.6km W Queremal, 1[♀] 14 Feb. 1976; Rio Raposo, human bait, 1[♀] "3-12-63," 1[♀] 14 Jan. 1963; Rio Raposo, 1[♀] 14 Oct. 1962, C. J. Marinkelle coll; Santander; Alto Rio, upon a tributary of Rio Magdalena, 400m, 2^{♀♀} 18 April 1948, L. Richter coll; Meta; Rio Guayuriba, a tributary of Rio Meta, 1[♀] Dec. 1946, L. Richter coll.

Discussion. Lee et al. (1969) found *Ph. magnificus* quite common at various localities on the Pacific coast of Colombia. As was my experience, they were taken with many different trapping methods throughout the year. I noted their most active periods to be just before sunrise and just after sunset. In addition to being active at ground level, Fairchild (1953) reports a 16.2% capture rate in the forest canopy in Panama. They are an active and persistent man biter.

Bequaert and Renjifo (1946) cite the following Colombian records: Cauca, Rio Micay; Choco, Istmina, Andagoya, Rio Cabi near Quibdo; Valle, km 87 on Cali to Buenaventura road; Rio Anchicaya, Veneral on Rio Yurumangui, Puerto Merizalde on Rio Maya, Quebrada San Joaquin near Buenaventura, Condoto, Utria, Rio Nimiquia.

Philipotabanus (Philipotabanus) nigrinubilus (Fairchild)
(Fig. 81)

Tabanus (Philipotabanus) nigrinubilus Fairchild 1953, Ann. Ent. Soc. Amer., 46(2):279-380, pl. 2, fig. 8, ♀.

Philipotabanus nigrinubilus Fairchild 1964, J. Med. Ent. 1(2): 176-177, ♂. Goodwin and Murdoch 1974, Ann. Ent. Soc. Amer., 67(1): 110, fig. 31.

A small to medium blackish species with dark legs, wings with large blackish brown discal band extending past fork of their vein, the clear fenestra around fork and crossveins small. Abdomen blackish, tergite 4 sometimes with a small middorsal silvery white hair patch.

Female. Length 9-11.5mm (N=20, \bar{x} =10.5). Frontal index 8.4-13.7 (\bar{x} =10.9). Frons convergent below, 0.5-0.7 (\bar{x} =.65) times as wide as vertex. The following original description of Fairchild describes well the Colombian material examined.

Eyes bare, unicolorous, probably greenish black or bronzy in life. Frons very narrow, about 10.7 times as high as basal width, steel grey pollinose, the callus black, slender, ridge-like. Vertex with a slightly raised subshiny patch, sometimes with a vestige of the anterior ocellus. Subcallus yellowish grey, fronto-clypeus and genae dark steel grey pollinose. Beard sparse, of black and pale grey hairs intermixed. First two and more or less of the base of third antennal segments dusky yellowish brown, remainder of third segment including style black. Palpi dusky yellowish brown, densely black haired. Proboscis slightly longer than palpi, blackish, the labella large and membranous.

Mesonotum and scutellum dark cinnamon brown to practically black, obscurely striped, thinly greyish pollinose and sparsely black haired. Pleura and sternum pale grey pollinose, sparsely pale haired. Wings with subepaulet acutely pointed, densely black setose. Wing pattern as in *calignosus*, but more intensely black, the hyaline fenestrae about the fork of third vein and end of discal cell very small, and the black band extending practically to the ends of the basal cells. Fore legs practically black, mid and hind femora basally black, the apices and tibiae and tarsi lighter, dusky yellowish brown.

Abdomen black or nearly so, subshiny, the first tergite thinly greyish pollinose. The first tergite bears sparse white hairs as do the extreme sides of second and third tergites and the fourth tergite bears a small and rather indistinct triangle of silvery white hairs, otherwise the tergites are clothed with rather sparse black hairs. Beneath, the abdomen is subshiny, sparsely grey pollinose, the first three tergites clothed with sparse pale hairs, the remainder largely with black hairs. (1953, pp. 279-280)

Male. Not seen by me. Fairchild gives the following description of a male from Panama: "Eyes holoptic, with large facets occupying about two-thirds of eye area, sharply differentiated from small facets, but not separated from them by a sharp line. Large facets are bright orange brown in life, small facets greenish bronze. There is a small tubercle at vertex, sunk between eyes. Antennae more slender than in ♀, dorsal angle less marked. Palpi porrect, sausage shaped, grey pollinose and black haired. It is easily associated with the ♀ on color and wing pattern, which do not differ noticeably" (1964, p. 176).

Distribution. Honduras, Panama, Colombia (Choco, Valle, Antioquia, Cauca).

Material examined. Honduras, 2♀♀. Panama, 13♀♀. Colombia: Choco; Upper Curiche River, 1♀ 23 Aug. 1967, D. G. Young coll; Valle; 41km E and 20km N Buenaventura, CO₂ baited flight trap, 2♀♀ 19 March 1976; Rio Zabaletas, CO₂ baited flight trap, 2♀♀ 19 Oct. 1975; Bajo Calima, CO₂ baited flight trap, 2♀♀ 5 Sept. 1975; Cauca; CO₂ baited flight trap, 1♀ 10 May 1976.

Discussion. Lee et al. (1969) report *P. nigrinubilus* from the Rio Raposo. Four females were captured, 2 at human bait on 11 May and 17 March 1964 and 2 from a light trap on 27 April and 11 Sept. 1964.

Goodwin and Murdoch (1974) describe the larva and pupa based on 4 larvae taken under the bark of a felled tree in Panama.

Philipotabanus (Philipotabanus) pterographicus (Fairchild)
(Fig. 79)

Tabanus (Philipotabanus) pterographicus Fairchild 1942, Ann. Ent. Soc. Amer., 35(4):459, pl. 2, fig. 15, ♀, Panama.

A small brown to pale brown species with yellowish brown legs, wing pattern reduced, pale brown without apical infuscation, and abdomen brown to yellowish brown with indistinct meddorsal white haired triangles.

Female. Length 7.5-10.5mm (N=12, \bar{x} =9.1mm). Frontal index 9.7-13.7. Frons convergent below, 0.5-0.65 as wide as vertex. The following is the original description of Fairchild.

Eyes bare, bronzy in life. Frons narrow, about 9 1/2 times as high as basal width, widest at vertex, pale yellowish brown. Frontal callus linear, brown, extending nearly to vertex, where there is a small, bare, slightly raised and discolored area. Subcallus, fronto-clypeus and genae pale yellowish grey pollinose, the last with sparse pale brownish hairs. Antennae orange yellow, the annulate portion darker, and with dark hairs on the first two and angle of the third segments. Palpi as figured, pale brown, black haired. Proboscis brown, the labella about 2/3 of total length, fleshy.

Mesonotum light brown, stripes nearly obsolete, dark haired; scutellum concolorous, lighter at apex, white haired. Pleura and sternum paler, sparsely brown and whitish haired. Legs yellowish brown, the fore pair darker, all black haired. Abdomen dirty yellowish brown, dark haired, darker at apex, and with small but well marked triangles of white hairs on hind margins of first to fourth tergites. Venter lighter, sternites obscurely pale margined. (1942c, p. 459)

Male. Undescribed.

Distribution. Panama, Ecuador, E Colombia.

Material examined. Panama, 12^{♂♂}. Ecuador, 3^{♂♂}.

Discussion. I have not seen Colombia specimens though D. G. Young collected it in the northern Choco. Two specimens in the collection of G. B. Fairchild from Ecuador agree with those from Panama except for having wider frons, frontal indices of 6.2 and 6.6. These measurements were not included with those presented at the outset of the description.

Genus *Stypommisa* Enderlein

Stypommisa Enderlein 1923, Deuts. Ent. zeits., p. 545; 1925, Mitt. Mus. Zool. Berlin, 11(2):369. Krober 1934, Rev. Ent., 4(2): 276, references. Fairchild 1971, Cat. S. Am. Dipt., 28:80, synonymy.

Stictotabanus Lutz 1914, nomen nudum. Fairchild 1961, Mem. Inst. Ows. Cruz, 59(2):244.

Stenotabanus: Fairchild 1942, Ann. Ent. Soc. Amer., 35(3):297, in part.

The genus *Stypommisa* is characterized by basicosta with few to many setae, a usually narrow to very narrow frons with drop shaped, clavate, or linear callus, a distinct tubercle at the vertex, and wings which are usually anteriorly and apically tinted, seldom entirely clear, often with clouds on the crossveins.

Twenty-four species are recognized, 7 from the study area, one of which is previously undescribed.

Key to *Stypommisa* Species

1. Wings glass clear. Frons less than 3 times as high as basal width, the callus broadly drop shaped. All tibiae bicolored, basally pale. Abdomen dark brown with a series of contiguous middorsal triangles and posterior margins of all tergites gray. *serena*
- 1'. Wings tinted or crossveins clouded or spotted. Frons over 3 times as high as basal width. 2
- 2(1'). Fork of third vein without appendix 3
- 2'. Fork of third vein always with an appendix which is rarely shorter than the adjacent vein segment. 5

- 3(2). Legs entirely black, black haired. Mesonotum prominently bluish white or blue gray striped. Abdomen with at least first 2 tergites bluish pruinose, and tergites 2-6 with small middorsal triangles and posterior lateral margins white haired (Fig. 88). *maruccii*
- 3'. Legs brown, at least in part, some tibiae at least partly pale haired. Mesonotum at most weakly striped. 4
- 4(3'). Fork of third vein with a small cloud, costal and marginal cells strongly tinted. Abdomen yellowish brown to dark brown in ground color, without prominent integumental marks, but with broad pale haired middorsal triangles (Fig. 87).
. *jaculatrix*
- 4'. Fork of third vein without distinct cloud, wings rather uniformly tinted. Abdomen reddish brown in ground color, tergite 2 with a distinct middorsal dark hourglass shaped mark. Vestiture black with small median transverse hind marginal golden hair tufts *simplex*
- 5(2'). Wing nearly hyaline, but clouds at fork of third vein and end of discal cell prominent; costal and marginal cells at most faintly smoky brown. Appendix long but shorter than adjacent vein segment. Style of third antennal segment contrastingly black. Abdominal tergites with very faint pale haired triangles and slender uninterrupted pale haired posterior borders *bipunctata* n. sp.
- 5'. Wing smoky brown along costal border and at the apex; the clouds on fork and crossveins small; appendix short or long, but

- always longer than the very short adjacent vein segment.
- Annuli contrasting or not 6
- 6(5'). Antennae orange, at most the terminal 2 annuli dusky or
or black. Clouds at fork of third vein faint or absent, that
at end of discal cell rarely present. Fore border of wing
evenly orange brown tinted. Abdomen largely densely orange
haired; at least the anterior segments with orange haired
triangles or hind marginal bands. Venter wholly orange
haired. *captiroptera*
- 6'. Antennae with style black, contrasting with yellow to orange
basal plate. Cloud on fork of third vein prominent though
small; that at end of discal cell sometimes faint. Wing
tinting uneven. Abdomen sparsely haired, the hairs predomi-
nantly dark 7
- 7(6'). Dark brownish species, the legs brown, the wings strongly
brown tinted in costal cell and apices of marginal and submar-
ginal cells, but sharply hyaline proximal to fork of third
vein. Abdomen dorsally black haired, ventrally whitish haired,
at least on hind margins of sternites *pequeniensis*
- 7'. Light orange brown species, the legs yellowish, the wings
yellow tinted in costal, and marginal cells, brownish in apex
of submarginal cell distal to fork, not sharply hyaline
proximally. Abdomen dorsally with wide to narrow yellow
haired hind marginal bands on at least first 5 segments. Ven-
ter wholly yellow or orange haired. n. sp.

Styponmisa bipuncta n. sp.

A small yellowish brown species with a narrow parallel sided frons, yellowish brown antennae with contrasting black annuli, unmarked thorax and abdomen, and yellowish legs with dusky protarsi. Wings nearly hyaline, very faintly brownish tinted along fore border, especially at apices of first 1-3 longitudinal veins, and with small pale brownish clouds at the apex of the discal cell and at fork of third vein. Length of fork from bifurcation to insertion of appendix greater than length of appendix.

Female. Length 9.5mm. Frontal index 5.4. Frons parallel sided, pale yellowish brown pollinose, vestiture of a few short curved dark brown hairs at the vertex. Ocellar tubercle raised, shiny dark brown with 3 distinct ocelli. Basal callus shiny brown, rectangular, 2 times higher than wide, not touching sides of frons. Median callus a slender ridge connected to basal callus and reaching about three-fourths distance to vertex. Subcallus pale yellowish brown pollinose. Genae and frontoclypeus pale grayish yellow pollinose, both with pale yellow hairs except for a few brownish hairs intermixed on the lower genae. Antennal segments 1 and 2 yellow orange and pale yellow pollinose, vestiture of fairly evenly distributed brownish hairs, those at the dorsal apex of the first segment somewhat thicker. Basal plate pale orange, about as wide as first segment at the dorsal angle. Dorsal angle obtuse. Style shorter than basal plate, contrastingly black. Palpi pale yellowish brown pollinose, about as wide as first antennal segment, somewhat inflated at the base and bluntly pointed. Vestiture of long pale yellow hairs on the first segment, a few brownish hairs apically, evenly distributed brownish hairs on the second with a few

longer yellow hairs ventrally. Proboscis slightly longer than palpi, brown and pale brown pollinose, labella wholly fleshy.

Mesonotum and scutellum yellowish brown in ground color with slightly paler pollinosity. Vestiture of numerous short erect black hairs and recumbent scale-like shiny yellow hairs. Pleura and coxae yellowish brown in ground color, pale grayish yellow pollinose with sparse pale yellow hairs. Legs pale yellow with short dark brown hairs predominating dorsally, yellowish hairs predominating ventrally. Protibiae faintly bicolored, the basal halves with slightly paler pollinosity and pale yellow hairs. Remainder of tibiae dusky and brown haired, the protarsi dark brown. Halteres pale yellowish brown. Basicosta with about 10 large setae. Wing hyaline, the veins brown, costal cell not darker than rest of wing, but anterior margin distal to stigma and apex weakly brownish tinted, small brown clouds at crossveins at apex of discal cell and at fork of third vein. Fork with a short appendix not as long as the rather long adjoining vein segment.

Abdomen above yellowish brown in ground with sparse pale yellow pollinosity. Dorsal vestiture of sparse short brown hairs except for an indistinct triangle of pale yellow hairs on tergite 4 and a narrow posterior border of pale hairs on tergite 5. Venter yellowish brown in ground color, pale yellow pollinose with numerous slender pale yellow hairs.

Male. Not known.

Distribution. Colombia (Valle).

Material examined. Colombia: Holotype, ♀, Valle, Rio Frio, La Carmelita, 13 June 1942, S. Renjifo coll. Paratypes, 3♀♀

same information as above but without dates. Holotype to be deposited in MCZ, paratypes in F.S.C.A. and collection of G. B. Fairchild.

Discussion. The holotype specimen is somewhat damaged, lacking 1 antenna, 1 palp, 1 wing, 1 protarsus, and both mesothoracic legs. It is however the only specimen of the 4 which has a complete antennae.

The paratypes are 8, 8.5, and 7mm long and have frontal indices of 6.0, 5.3, and 4.9.

The abdominal dorsum of the holotype is somewhat denuded, one of the paratypes showing quite vague pale yellow hair triangles on tergites 2-6. All the specimens are somewhat denuded and probably a little faded after 36 years.

St. bipuncta is quite similar to *St. venosa* (Bigot) which has only the terminal annulus dark, has darker clouds on the wings, and has a fringe of yellow hairs all along the posterior borders of abdominal tergites 2-6 in addition to the vague middorsal pale haired triangles.

This species can be readily distinguished from the 3 similar brown species recorded from western Colombia by the practically hyaline wings, long appendix arising from a long vein segment, and large clouds on fork and apex of discal cell. The name refers to the 2 prominent wing spots.

Stypommisa captiroptera (Krober)
(Fig. 91)

Tabanus (Macrocornus) captiropterus Krober 1930, Zool. Anz.,
78(1-2):10, fig. 8, ♀, Venezuela.

Stenotabanus xenium Fairchild 1947, Ann. Ent. Soc. Amer., (1946)
39(4):568, pl. 1, fig. 5, ♀, Panama.

Stypommisa captiroptera: Fairchild 1971, Cat. S. Amer. Dipt.
Fasc. 28, p. 81, synonymy.

A medium sized pale brown species with an unstriped thorax, unicolorous yellowish brown legs, wings tinted yellowish brown costally, and abdomen densely golden haired, unpatterned or with vague middorsal golden yellow hair patches.

Female. Length 10-13mm (N=23, \bar{x} =11.8mm). Frontal index 5.0-6.2 (\bar{x} =5.7). Frons 0.8-1.0 times narrower at base than vertex (\bar{x} =0.9). Frons yellowish brown pollinose, covered with numerous short brownish hairs. Tubercle at vertex small, slightly raised, with vestiges of 3 ocelli. Callus brown not touching sides of frons, drop shaped, extended above into a narrow slightly raised ridge reaching more than half height of frons. Eyes bare, blackish green in life. Subcallus, genae, and frontoclypeus pale yellowish brown pollinose with mostly pale yellow hairs. Antennal segments 1 and 2 pale yellowish brown pollinose with short black hairs; segment 3 yellowish orange except last 1 or 2 annuli which are brownish, basal plate longer than wide, the dorsal tooth a right angle. Palpi pale yellow, bluntly pointed, only slightly swollen basally, vestiture of numerous short dark hairs. Proboscis wholly fleshy, pale yellow pollinose and about as long as frons height. Beard of short yellowish brown hairs.

Mesonotum and scutellum unmarked pale yellowish brown in ground color with pale grayish yellow pollinosity. Vestiture a mixture of numerous short black and shiny pale yellow hairs. Pleura and coxae densely pale grayish yellow pollinose with whitish hairs. Legs pale

reddish brown, the tarsi dusky; leg hairs mostly pale yellow on femora, mostly dark on tibiae and tarsi. Basicosta with about 15 small setae. Wing as figured, the costal cell and usually marginal cell anteriorly yellow, remainder with a smoky brown tint.

Abdomen yellowish brown, the last few segments darker. Vestiture above predominantly of short shiny orange yellow hairs on tergites 1-3 with some black hairs dorsolaterally; the remaining segments contain increasing numbers of black hairs though middorsal and lateral areas of yellow orange hairs remain. Below vestiture is wholly of short orange yellow hairs.

Male. Males are readily associated with the females. The eyes are holoptic with well demarcated large facets on the upper two-thirds. Upper area brown, separated from the lower olive drab area by a very narrow dark brown stripe. There is a distinct vertical tubercle sunk between the eyes at vertex. Palpi are pale yellow, porrect, swollen, and about twice as long as wide. Antennae as female but more slender. Abdominal vestiture above is mostly of black hairs with a few mid-dorsal yellow hairs, all of these longer and sparser than in the female.

Distribution. Nicaragua to Peru, Venezuela, Guyana, Brazil. Colombia (Choco, Valle, Cauca, Antioquia).

Material examined. Panama, 9^{♀♀} (including a paratype of *Stenotabanus venium* and a homotype of *Tabanus captiropterus*). Nicaragua, 2^{♀♀}. Costa Rica, 1[♀]. Ecuador, 3^{♀♀}. Peru, 2^{♀♀}. Brazil, 4^{♀♀} (including a homotype of *T. captiropterus*). Colombia: Choco; La Teresita, 1[♀] 26 Sept. 1967, D. G. Young coll; Curiche River, 1[♀] 4 Aug. 1967, D. G. Young coll; between Rio San Juan and Baudo, 2^{♀♀} 23 Feb. 1976; Antioquia; Rio Anori, Zaragoza, 2^{♀♀} Sept. 1970; D. G. Young coll;

Rio Anori Valley, 520m, at light, 1♂ 17 April 1971, 1♂ 21 June 1971, 1♀ 9 March 1971, C. Porter coll; Valle; 25km E Buenaventura, 1♀ 12 Aug. 1973, Wilkerson and Young colls; Rio Zabaletas, 4km E Zabaletas, 5♀♀ 5-6 July 1975, 6♀♀ 18 Aug. 1975, 4♀♀ 19 Oct. 1975; Lower Anchicaya, 1♀ 16 Aug. 1975; Bajo Calima, 1♀ 5 Sept. 1975; 41km E, 20km N Buenaventura, 1♀ 19 March 1976; Cauca; Guapi, 1♀ 10 May 1976. Putumayo; Puerto Asis, 3♀ 15 April 1976, CO₂ baited flight trap.

Discussion. Porter (pers. comm. 1976) reports *S. captivoptera* from the Providencia region of Antioquia. He found them to be crepuscular biters.

Fairchild (unpublished, 1978) reports this species to be found in Panama, as in Colombia, at low elevations in areas of high rainfall.

Styponmisa jaculatrix (Fairchild)
(Fig. 87)

Stenotabanus jaculator Fairchild 1942, Ann. Ent. Soc. Amer., 35(3):309, fig. 9, ♀, Panama; 1951, op. cit., 44(3):452:453, ♂.

Styponmisa jaculator: Barretto 1957, Rev. Brasil, Malar., 8(1):82 (1956), Guyana.

A small dark grayish brown species with bicolored antennae, vaguely bicolored brown legs, wings with faint brown clouds on cross-veins, and abdomen with indistinct middorsal pale hair triangles and narrow hind marginal pale bands.

Female. Length 7.5-10.5mm (N=20, \bar{x} =8.6mm). Frontal index 4.2-5.7 (\bar{x} =4.9). Frons slightly divergent below, 1.0-1.3 (\bar{x} =1.1) times wider at base than at vertex. Frons sparsely grayish yellow pollinose with short dark hairs. Callus two-thirds as high as frons, shiny

dark brown and drop shaped, tapering gradually to a fine point. Tubercle at vertex slightly raised, subshiny, bears vestiges of ocelli. Eyes bare, in life bronzy to yellowish green with a narrow dark median line. Subcallus pale yellowish brown pollinose, genae and frontoclypeus pale grayish brown pollinose. Antennal segments 1 and 2 yellowish brown and black haired. Basal plate of segment 3 yellowish orange with a poorly produced obtuse dorsal angle; annuli blackish brown. Palpi somewhat pointed, pale grayish brown pollinose, black haired except for some silvery hairs ventrally. Proboscis compact, brown pollinose and entirely fleshy. Beard mostly sparse pale gray haired with a few black hairs.

Mesonotum and scutellum blackish brown in ground color with pale silvery gray pollinosity, paler laterally. Vestiture of short erect black hairs and recumbent shiny yellowish hairs. Pleura and coxae blackish brown in ground color with dense gray pollinosity and sparse pale yellow or gray hairs. Profemora mostly dark brown, paler apically; meso- and metafemora yellowish brown, slightly darker basally. Basal halves of protibiae yellowish brown with shiny pale yellow hairs, apical halves and protarsi blackish brown with dark hairs. Meso- and metatibiae and tarsi brown, the tibiae paler basally. Basicosta with setae as dense as on costa. Wings as figured with brownish markings.

Abdomen dark brown above with sparse bluish gray pruinosity, denser on first two segments. Vestiture of numerous short black hairs with indistinct pale yellow to white hair patches laterally and small indistinct pale yellow to white triangles middorsally on all segments. Hind margins of all tergites with a fringe of pale hairs. Abdomen below dark brown evenly pale bluish gray pruinose with short pale yellow hairs.

Male. As female but paler overall. Palpi pale yellow, porrect, three times longer than wide with mostly pale hairs. Small vertical tubercle at vertex of head. Eyes holoptic, upper three-fourths with large facets not distinctly demarcated from the small ones below.

Distribution. Panama to British Guyana. Colombia (Choco).

Material examined. Panama, 21^{♂♂}, 2♂♂ (one labeled neoparatype, the other neallotype by G. B. Fairchild). Colombia: Choco; La Teresita, 2^{♂♂} 21-29 March 1967, D. G. Young coll; Curiche River, 2^{♂♂} 21-25 April 1967, D. G. Young coll.

Discussion. Not collected by me. Porter (pers. comm. 1976) reports this species from the Providencia Region of Antioquia infrequently in the forest canopy. Fairchild (unpublished 1978) reports it in Panama from sea level to 4000ft at ground level and in the canopy, taken in stable traps, light traps and at human bait.

Stypomissa marucei (Fairchild)
(Fig. 88)

Stenotabanus marucei Fairchild 1947, Ann. Ent. Soc. Amer., 39(4):568, fig. 8 (1946) ♀, San Pulas, Panama; 1958, Ann. Ent. Soc. Amer., 51(6):529, synonymy.

Stenotabanus frondicolus Fairchild 1951, Ann. Ent. Soc. Amer., 44(3):453-454, fig. 5, ♀, Panama; 1953, Proc. Ent. Soc. Washington, 55(5):241.

A small to medium robust dark bluish gray species with a distinctly striped thorax, unicolorous dark legs, subhyaline wings with a small cloud on fork of third vein, and abdomen banded bluish and black.

Female. Frontal index 4.2-5.3 (N=20, \bar{x} =4.9). Length 9-11mm (\bar{x} =10.0mm).

The following is the original description of Fairchild.

Length 10mm, of wing 10mm. Eyes bare, in life green with a single broad median purple stripe. Frons parallel sided, about 4 times as high as wide, yellowish grey pollinose. Frontal callus black, nearly as wide as frons basally, tapering to a point at about the middle of the frons. Vertexal tubercle prominent, pollinose, and with well-marked vestiges of ocelli. Subcallus, face and cheeks yellowish brown pollinose, the latter with scattered dark erect hairs. Antennae reddish, the first two segments not inflated and with black hairs. Third segment with the dorsal angle acute and bearing a tuft of black hairs. Annulate portion black, hardly half the length of the basal portion. Palpi brownish, moderately slender, blunt-tipped, black haired. Proboscis about two-thirds head height, blackish, the labelli large and membranous. Beard sparse, greyish.

Mesonotum blackish, with a pair of narrow submedian yellowish stripes reaching the scutellum. Lateral margins yellowish and brassy haired. Scutellum blackish, with sparse brassy hairs. Pleura yellowish grey, a dark stripe passing forward from the wing bases. Legs wholly black and black haired. Wings with subepaulet bearing macrotrichia, but less dense than on the costa. Costa, subcosta, and first vein above with macrotrichia. Wings hyaline, the fore border yellowish smoky, and a light though distinct cloud on the fork of the third vein. All cells but the anal open; no appendix on upper branch of third vein. Abdomen mainly black, black haired. First segment wholly and succeeding segments on posterior margins pearly grey pollinose, changing to brilliant pale blue with light of proper incidence. Second, third, fourth and last tergites with small median tufts of pale hairs. Sides of all tergites with sparse pale hairs. Venter black, wholly pearly pollinose, sparsely pale haired on first and second sternites, the rest black haired.

(1947, p. 568)

I found the eye in life to be dark metallic purple with a metallic green stripe. Fairchild (unpublished 1978) reports the eyes as being "bright brick red, with a narrow transverse green stripe fading to green with a dark stripe shortly after death." It is apparent some variation exists here and the colors change quickly after death.

Male. Easily associated with female. Eyes contiguous, the upper two-thirds of large facets which gradually diminish in size toward the bottom of the eye to a size markedly smaller than those above. At the vertex is a small vertical tubercle. Antennae are as in female but more slender. Palpi are porrect, pale yellow with numerous long dark hairs, sausage shaped and curved upward.

Distribution. Nicaragua to Colombia (Choco, Antioquia, Valle).

Material examined. Panama, 16^{♂♂} (including 4 paratypes of *Stenotabanus frondicalus*). Nicaragua, 1[♀]. Colombia: Choco; Curiche River, 1[♀] 18 Sept. 1967, 1[♀] 26 Oct. 1967, D. G. Young coll; between Rio San Juan and Rio Baudo, CO₂ baited flight trap, 1[♀] 23 Feb. 1976; Valle; (all netted or in flight traps with and without CO₂) 25km E Buenaventura, 7^{♂♂} 12 Aug. 1973; Rio Zabaletas, 3^{♂♂} 5-6 July 1975, 4^{♂♂} 18 Aug. 1975; Lower Anchicaya, 10^{♂♂} 11 June 1975, 2^{♂♂} 16 Aug. 1975, 2^{♂♂} 26 Jan. 1976, 7^{♂♂} 5 March 1976, 7^{♂♂} 2 April 1976; Bajo Calima, 10km E Buenaventura, 1♂ 5 Sept. 1975; 41km E 20km N Buenaventura, 6^{♂♂} 19 March 1976; Rio Raposo, 1[♀] 14 Oct. 1963.

Discussion. Porter (pers. comm. 1976) found *S. maruccii* in Antioquia but as an infrequent localized biter in the canopy. Lee et al. (1969) caught 23 females in the Rio Raposo area of Valle using human bait. All were caught 13-18m above ground in the forest canopy.

This species is most unusual in its striking resemblance to flesh flies (*Sarcophagidae*).

Stygomysia pequeniensis (Fairchild)
(Fig. 89, 90)

Stenotabanus pequeniensis Fairchild 1942, Ann. Ent. Soc. Amer., 35(3):308-309, fig. 13, ♀, Panama.

Stenotabanus pequiensis: Philip (lapsus) 1960, Proc. Calif. Acad. Sci., Ser. 4, 31(3):77, Peru.

A medium sized dark brown species with dark antennal annuli, a narrow frons, unstriped thorax, unicolorous brown legs, and brownish wing with small spots on crossveins and fort of third vein.

Female. Length 10-12mm (N=20, \bar{x} =10.9mm). Frontal index 5.6-8.4 (\bar{x} =6.8). Frons narrow below, 0.67-0.88 (\bar{x} =.75) times width at vertex.

The following original description of Fairchild matches very well the specimens from Colombia.

Eyes bare, uniformly green in life. Frons narrow, about six and one-half times as high as basal width, yellowish brown pollinose. Basal callus black, about twice as high as wide, nearly as wide as frons, a prolonged above in a slender line two-thirds the distance to the vertex. Vertexal tubercle present, small, but often with vestiges of ocelli. Subcallus orange brown pollinose. Fronto-clypeus and genae greyish pollinose, the latter with a sparse grey beard. Antennae yellowish brown, the terminal annuli darker. First and second segments not swollen, black haired. Basal part of third segment a little longer than annulate portion, and somewhat longer than broad. Dorsal angle moderate, with a tuft of black hairs. Palpi brownish, black haired, slender, nearly as long as antennae. Proboscis a little longer than palpi, brown, the labella about half length of proboscis, fleshy.

Mesonotum dark brown, dark haired, unstriped. Pleura and sternum greyish. Legs dark brown, the coxae greyish pollinose and grey haired. Subepaulet with macrotrichia, but much less densely hairy than costa. Costa, subcosta, first and basal part of fifth veins with macrotrichia above, costa and subcosta also hairy beneath. Upper fork of third vein with a short appendix. Whole wing fumose, but definitely darker along costa and at apex. Cross veins with small dark clouds. Abdomen yellowish brown, darker towards apex, black haired, rarely with faint indications of yellowish mid-dorsal triangles. Venter paler, with pale hairs.

(1942b, p. 308)

Male. Easily associated with female. Eyes holoptic with large facets occupying the upper three-fourths of eye, strongly demarcated

and differentiated from small facets below. Upper facets bronze, the lower greenish in life. At the vertex is a small vertical tubercle. Palpi are porrect, slightly swollen, pale yellow, and about 3 times longer than wide.

Distribution. Costa Rica to Peru. Colombia (Choco, Antioquia, Valle, Cauca, Putumayo, Meta).

Material examined. Panama, 2♂♂ 13⁰⁰ (including a paratype of *Stenotabanus pequeniensis*). Ecuador, 9⁰⁰. Peru, 3⁰⁰. Colombia: Choco; La Teresita, 2⁰⁰ May 1967, 1⁰ "3-6-1967," D. G. Young coll; Curiche, 1⁰ 13 May 1967, 1⁰ 10 July 1967, D. G. Young coll; between Rio San Juan and Rio Baudo, CO₂ baited flight trap 49⁰⁰ 23 Feb. 1976; Antioquia; Rio Anori, SW Zaragoza, 1⁰ Sept. 1970, D. G. Young coll; Rio Anori Valley, Providencia, 410m, human bait, 1⁰ 5 May 1970; La Tirana, Providencia 25km W and 22km S of Zaragoza, in house at night, 10 30 May 1971, D. G. Young coll; Valle; Lower Anchicaya, netted and in CO₂ baited and unbaited flight traps, 4⁰⁰ 10 Aug. 1973, 3⁰⁰ 28 Jan. 1975, 24⁰⁰ 1♂ 11-14 June 1975, 8⁰⁰ 16 Aug. 1975, 8⁰⁰ 5 March 1976, 3⁰⁰ 2 April 1976; Lago Calima, 8km below dam, from livestock, 1⁰ 24 April 1976; Rio Zabaletas, netted, 1⁰ 18 Aug. 1975; 1⁰ 5 July 1975, 25km E Buenaventura, flight trap, 1⁰ 12 Aug. 1973; 41km E 20km N Buenaventura, CO₂ baited flight trap, 3⁰⁰ 19 March 1976; Cauca, Guapi, CO₂ baited flight trap, 1⁰ 10 May 1976.

Discussion. C. Porter (pers. comm. 1976) found this species to be a common late afternoon biter in Antioquia.

Bequaert and Renjifo report *S. pequeniensis* from Meta, Restrepo, east of the Andes, but specimens from Putumayo, Mocoa and Puerto Asis,

also east of the Andes, are not typical and the specimens from Restrepo will need restudy before assigning them unequivocally to this species.

Stypommisa serena (Krober)

Tabanus serenus Krober 1931, Stett. Ent. zeit., 92:304, ♀, Venezuela.

Stenotabanus vapidus Fairchild 1964, J. Med. Ent., 1(2):172-174, fig. 10, ♀, Panama.

The following is the original description of *S. vapidus* Fairchild:

A brown species with pale abdominal bands and irregular middorsal stripe, frons quite broad and small round callus not touching the eyes.

Female. Length 10.5mm; wing 9mm. Eyes bare, bronzy, without bands. Frons a little less than 3x as high as basal width, brownish grey pollinose. Callus round, protuberant, shiny, dark brown, narrower than frons, with a pollinose upper triangular prolongation narrowing to a fine line reaching 1/2 way to vertex. Vertex with a small denuded tubercle, set at apex of a slender vertical shiny strip. Subcallus grey pollinose; area above antennal bases tinged yellowish. Frontoclypeus and genae pale grey pollinose, white-haired. Antennae brownish orange, basal segments black-haired, basal plate of segment 3 with a strong dorsal angle. Palpi pale yellowish, grey pollinose, sparsely black-haired. Proboscis exceeding palpi, blackish; labella large and membranous.

Mesonotum dark grey, with lighter pollinosity forming indistinct stripes, sutures reddish, sparsely beset with short black hairs. Scutellum pale grey. Pleura pale grey, white-haired. Wings glass clear, stigma yellow, venation normal, no appendix on fork of 3rd vein. Basicoستا acutely pointed, with about 12 black setae. Legs brown, femora darker, tibiae more yellowish. Fore femora, apical halves of fore tibiae and tips of mid and hind tibiae and all tarsi black-haired. Basal 1/2 of fore tibia and remainder of legs pale-haired, but fore tibiae more prominently bicolored than the others. No hind tibial fringe.

Abdomen dark brown, 1st and at least base of 2nd tergite paler, reddish. Hind and lateral margins of all tergites broadly pale, whitish, this color forming narrow middorsal triangles which reach forward to fore

border of each segment, forming an irregular middorsal stripe. This stripe is accentuated in some lights by a silvery grey pruinosity which is more extensive than pale ground color. Hairs rather sparse, dark, except for small poorly defined patches of yellowish hairs on mid-posterior borders of most tergites. Sternites light brown, pale grey pollinose, sparsely pale-haired.

(1964, pp. 172, 174)

The material examined has frontal indices of 2.7-3.2 ($N=6$, $\bar{x}=2.9$) with the frons convergent below, 0.8-0.93 ($\bar{x}=.9$) times narrower at the base than the vertex. Lengths range from 8.5-10mm ($\bar{x}=9.3$ mm).

Male. Not known.

Distribution. Panama, E Colombia (Antioquia, Meta, Boyaca), Venezuela, E Peru.

Material examined. Panama, 2 $\sigma\sigma$ (including 1 paratype of Peru, 1 σ paratype of *S. vapidus*). Colombia: (all paratypes of *S. vapidus* and one compared to type of *T. serenus*) Meta; Restrepo, 500m, 1 σ 1936, J. Bequaert coll; Boyaca, 900m, 2 $\sigma\sigma$ 1936 (1 biting man), J. Bequaert coll.

Discussion. Not collected by me from Colombia. C. Porter (pers. comm. 1976) reports *S. serena* from the Providencia region of Antioquia. The known distribution of this species suggests that in Colombia it may be essentially an Amazonian species.

Stypommisa simplex (Walker)

Tabanus simplex Walker 1850, Insecta Saundersiana, Diptera 1:34. Colombia.

Tabanus rufiventris Macquart 1846, Mem. Soc. Roy. Sci., Agr. Arts Lille, p. 166, preocc. Fabricius, 1805), type locality Colombia, Bogota.

Hybomitra indiorum Bequaert and Renjifo-Salcedo 1946, Psyche, 53(3-4):75, Colombia, Bogota (new name for *rufiventris* Macquart).

Dieladocera simplex: Fairchild 1971, Cat. S. Amer. Dipt. Fasc. 28, p. 74, synonymy.

A medium sized dark reddish brown species with an unstriped dark thorax, legs indistinctly bicolored dark brown and reddish brown and abdomen above with a middorsal rectangular black spot on tergites 1 and 2 and small middorsal pale yellow hair patches on tergites 1-6.

Female. Length 11-13mm (N=20, \bar{x} =12.6mm). Frontal index 3.5-4.3 (\bar{x} =3.8). Frons slightly divergent below, 1.1-1.2 (\bar{x} =1.14) times wider than at vertex. Frons yellowish brown pollinose, subshiny dark reddish brown at the vertex, vestiture of numerous short black hairs. Ocellar tubercle and vestiges of ocelli present although indistinct. Callus dark reddish brown, paler below, not touching sides of frons, drop shaped, narrowing gradually to a blunt point two-thirds the distance to vertex. Eyes covered with short sparse hairs, easily seen under low magnification. Subcallus, genae, and frontoclypeus yellowish brown pollinose, the genae and upper frontoclypeus with a grayish tint. Antennal segments 1 and 2 yellowish brown pollinose with numerous black hairs; segment 3 with basal plate bearing a small obtuse dorsal angle, the annuli and mesial portion of the basal plate dark reddish brown, remainder reddish brown. Palpi stout, about as long as frons height, pale yellowish brown covered with numerous short black hairs. Proboscis dark brown pollinose, slightly longer than palpi, entirely fleshy. Beard pale yellowish brown.

Mesonotum and scutellum dark brown paler above wing bases, with sparse grayish pollinosity and numerous erect short black hairs and

recumbent short shiny yellow hairs. Pleura and coxae dark brown in ground color, paler below wing base, covered with dense gray pollinosity and predominantly pale yellow haired. Prothoracic legs blackish brown except basal halves of tibiae which are reddish brown and pale haired. Meso- and metathoracic legs reddish brown, ventrally the femora and the tibiae basally paler and pale haired. Basicosta with about 15 setae, slightly smaller than those on the costa. Wing without definite pattern, tinted brownish costally and on vein margins; fork of third vein lacks an appendix.

Abdomen above reddish brown, tergite 1 blackish, tergite 2 with a middorsal blackish rectangular spot and tergites 4-7 dusky. Vestiture mostly of numerous short black hairs except for small lateral pale yellow hair tufts and small middorsal pale yellow tufts on tergites 1-6. Below abdomen yellowish brown on first segments becoming blackish on last segments. Sternite 1 and anterior part of 2 with a small black spot. Vestiture of short black hairs except for small pale yellow lateral fringes on sternites 2-6.

Male. Not known.

Distribution. Colombia (Caqueta, Cundinamarca, Valle).

Material examined. Colombia: Caqueta; Florencia, 1[♀] 1936 (labeled *H. indiorum* Bequaert = *rufiventris* Macquart, J. Bequaert det. and *Tabanus simplex* Walker det. G. B. Fairchild 1957); "La Vega," Museum Paris, Fr. Apollinaire-Marie, 1[♀] 192?; Valle; Penas Blancas; from horses and cattle and flight traps, 8^{♂♂} Aug. 1973, 5^{♂♂} Oct. 1974, 10^{♂♂} Dec. 1974, 57^{♂♂} Jan. 1975, 34^{♂♂} Feb. 1975, 33^{♂♂} March 1975, 7^{♂♂} April 1975, 4^{♂♂} July 1975, 57^{♂♂} Aug. 1975, 7^{♂♂} Sept. 1975, 4^{♂♂} Oct. 1975, 8^{♂♂} Feb. 1976, 42^{♂♂} March 1976; Huila; Finca Meremburg near Leticia, 2250m, horse bait, 1[♀] 26 Feb. 1976.

Discussion. Generic placement of this species is difficult since it fits no definition well. I place it in *Stypommisa* due to the presence of an ocellar tubercle, narrow clavate callus, lack of an antennal spine, somewhat reduced number of setae on the basicosta, and lack of strong wing pattern.

S. simplex is evidently confined to a specialized habitat and altitude zone since I collected it at only one site in Valle where it was quite common but nowhere else save in a similar ecological zone in Huila.

Collections from horses at Penas Blancas yielded specimens in all months of the year with peak numbers in Jan. through March and in Aug.

Twenty-two 12hr horse baited captures at Penas Blancas between Jan. 1975 and Feb. 1976 produced 56 specimens. Nearly 60% were captured biting the front legs and 22% the rear legs.

Biting activity was encountered throughout the daylight hours with peak activity between 1200hrs and 1500hrs. Temperature during capture ranged from 21° to 28°C with most being caught between 21.5° and 25.6°. RH ranged from 49% to 78% with broad peak of activity between 58% and 78%.

Bequaert and Renjifo report this species (as *H. indiorum*) from Caqueta, Florencia.

Stypommisa n. sp.
(Fig. 13G-I)

The species here described in the key is presently under study by C. Porter; further discussion will be deferred pending his publication.

Material examined. Colombia: Choco; between Rio San Juan and Rio Baudo, CO₂ baited flight trap, 16♂♂ 23 Feb. 1976; Valle; 8km below dam Lago Calima, netted and animal bait, 1♂ 16 July 1975, 2♀♀ 22 Aug. 1975, 6♀♀ 4 Sept. 1975, 1♂ 2 Oct. 1975, 1♂ 21 Nov. 1975, 1♂ 17 Jan. 1976, 3♀♀ March 1976, 7♀♀ 9 April 1976; "Playa Rica," 15km below dam Lago Calima, animal bait, 3♀♀ 19 Dec. 1975, 1♂ 3 Feb. 1976; Ladrilleros, 30km N Buenaventura, flight trap, 2♀♀ 23 Jan. 1975; Rio Zabaletas, 4km E Zabaletas, netted and CO₂ baited flight trap, 1♂ 3 June 1975, 2♀♀ 6 July 1975, 2♀♀ 19 Oct. 1975, 7♀♀ 18 Aug. 1975; 41km E 20km N Buenaventura, netted and CO₂ baited flight trap, 1♂ 6 July 1975, 2♀♀ 22 Nov. 1975, 1♂ 5 Dec. 1975, 3♀♀ 19 March 1976; Lower Anchicaya, netted and CO₂ baited flight trap, 7♀♀ 10 Aug. 1973, 1♂ 28 Jan. 1975, 16♀♀ June 1975, 14♀♀ 16 Aug. 1975, 12♀♀ 5 March 1976, 9♀♀ 2 April 1976; Rio Raposo, 1♂ 2 Dec. 1963, V. H. Lee leg.; Buenaventura, human bait, 1♂ 7 Oct. 1964, V. Lee coll; Antioquia; Rio Anori Valley, 2♀♀ 1♂ April 1971, 5♀♀ 1♂ May 1971, 2♀♀ June 1971.

Genus *Leucotabanus* Lutz

Leucotabanus Lutz 1913, Brasil Medico, 27, No. 45, p. 487.

Fairchild 1941, Ann. Ent. Soc. America, 34(3):629-631, references, key; 1953, Ann. Ent. Soc. America, 46(2):274-276, key.

Leucotabanus is characterized by a nearly bare to setose basicoxa, a medium to narrow frons, the callus not touching its sides, tubercle often with ocelli at vertex, and short proboscis with an unsclerotized labella. Most are dark blackish species with a contrastingly pale scutellum, the abdomen usually with pale bands and median triangles.

Three of the 15 described species are reported from the study area.

Key to *Leucotabanus* Species

1. Mesonotum and scutellum entirely clothed with bright yellow hairs. Abdomen above entirely black *flavinotum*
- 1'. Mesonotum brown or blackish, lateral aspects of mesonotum and scutellum paler, usually with white, grayish, or yellow-orange hairs. Abdominal tergites marked with pale patches or with pale apical borders 2
- 2(1'). First tergite with lateral white hair patches. Second tergite with a single median lateral white hair patch, sometimes narrowly contiguous. Fourth tergite more than two-thirds white, the band widest in the middle. Remaining tergites entirely dark. Abdomen not pointed at tip. Palpi pale yellow or brown. *canithorax*

2'. Second tergite narrowly white-haired apically, widened in the middle and sides. Fourth tergite at most half white. Abdomen sharply pointed at tip. Palpi black and black haired. *exaestuans*

Leucotabanus canithorax Fairchild

Leucotabanus canithorax Fairchild 1941, Ann. Ent. Soc. Amer., 34(3): 634-636, fig. 5, ♀, Panama; 1953, op. cit., 46(2):275, in key only; 1956, Smiths. Miscell. Coll., 131(3):10.

A medium sized brown species with pale markings, third antennal segment black, legs tricolored black, white, and pale yellow, thorax with a pale haired posterior band, and abdomen with apical pale haired patches or bands on segments 1, 2, and 4.

Female. The original description of Fairchild follows these additional notes. Callus not touching sides of frons, drop shaped narrowing to a thin low ridge reaching about half way to vertex. Vertex above ocellar tubercle subshiny yellowish brown. Basal plate with a well produced yet obtuse dorsal angle. Palpi slightly inflated and bluntly pointed.

Length 13-16mm. Frons, antennae, and palpi as figured. Antennae dark brown on first two segments, wholly black on third. Frontal callus chestnut brown. Palpi pale brownish, the basal two-thirds white haired, the apices black haired. Legs jet black, except most of all tibiae, which are yellowish with white hairs. Mesonotum purplish brown, white haired, but with a pair of broad dark haired longitudinal bands, which coalesce at the level of the wing and extend as a unit to the scutellum. The white haired area between these bands is often indistinctly striped. Sides of mesonotum, pleura, and scutellum white haired, with a narrow line of dark hair from wing bases to anterior spiracle. Abdomen dark chocolate brown to black, densely black haired.

Tergite 1 with conspicuous patches of white hairs on the lateral hind margins, tergite 2 with similar but larger patches and a large median white triangle unconnected to the side patches. Tergite 4 bears a continuous white hind marginal band, narrow at the side, but nearly as wide as the tergite in the middle. Rest of abdomen entirely black haired. Old specimens lose most of their hair, and appear much lighter.

(1941, pp. 635-636)

Male. As female but white bands on abdomen are broader, that of the second segment covering it completely.

Distribution. Belice, Panama, Guyana, Trinidad, Colombia (Magdalena).

Material examined. Panama, 2^{♂♂}. British Guyana, 2^{♂♂}. Trinidad, 1♂.

Discussion. *L. canithorax* has seldom been reported from Colombia, Bequaert and Renjifo (1946) give the only definite locality as Magdalena, Sevilla. The original description was of a male from Colombia without definite locality. It probably occurs in northern Choco, though no material has been seen.

Leucotabanus exaestuans (Linnaeus)

Tabanus exaestuans Linnaeus 1767, Syst. nat. Ed. 12, 1, pt. 2, p.1000, Amer. Merid. Philip 1952, Ann. Ent. Soc. Amer., 45:312, type seen.

Leucotabanus exaestuans: Philip 1960, Proc. Calif. Acad. Sci., Ser. 4, 31(3):91, Peru. Goodwin and Murdoch 1974, Ann. Ent. Soc. Amer., 67(1):108, figs. 14, 28.

Leucotabanus leucaspis: Fairchild 1941, Ann. Ent. Soc. Amer., 34(3):632-634, fig. 7, ♀, Panama, full references and synonymy; 1942, op. cit., 35(1):88, seasonal distribution; 1953, op. cit., 46(2):275, in key.

A medium sized dark brown to black species with black antennae and palpi, mesonotum dark with a white haired border and white haired scutellum, legs bicolored black and white, wings hyaline, and abdomen with white bands on at least tergites 2 and 4.

Female. Length 11-13mm (N=20, \bar{x} =11.7mm). Frontal index 4.6-6.4 (\bar{x} =5.65). Frons brownish yellow pollinose, grayish toward the vertex, vestiture of numerous short black hairs. Ocellar tubercle and 3 distinct ocelli present. Basal callus black, ovoid, not touching sides of frons, attached median callus is a thin slightly raised ridge reaching two-thirds distance to vertex. Eyes bare, blackish purple in life. Subcallus brownish yellow pollinose. Genae and frontoclypeus pale grayish yellow pollinose with a few short dark hairs on their upper areas. Beard is of sparse white hairs. Antennal segment 1 dark gray pollinose with black hairs, segment 2 reddish brown and black haired, and segment 3 blackish, the basal plate with an obtuse dorsal angle. Palpi grayish black pollinose with numerous short black hairs. Palpi somewhat swollen basally and bluntly pointed.

Mesonotum brownish black to black in ground color, grayish brown pollinose, densely pale gray pollinose laterally. Vestiture, numerous short black hairs and longer white hairs laterally. Scutellum densely pale gray pollinose with long white hairs. Pleura dark gray pollinose with sparse pale hairs except for dense white haired patches below wing base. Legs black and black haired except basal half of protibia and basal three-fourths of meso- and metatibiae which are white to pale yellow with concolorous hairs. Basicosta setose, wings hyaline.

Abdomen above blackish brown to black with numerous short black hairs, at least tergites 2 and 4 with white haired pale bands on their

posterior borders but some specimens also with bands or small median triangles on the fifth and sixth tergites and more rarely with white on tergite 3. The band on tergite 2 narrow but widened in the middle and on the sides, that of tergite 4 no more than half the segmental width. Below essentially as dorsum, entire sternite 2 pale, pale band of 4 widened mesially. Thin pale borders may also be present on sternites 3, 5, and 6.

Male. Not seen by me from Colombia, a Panamanian specimen is here described. As female but much paler. Eyes holoptic, with a small tubercle at the vertex. Large facets occupying upper two-thirds of eye well demarcated and differentiated from the small ones below. Antennae as in female, more slender and paler. Palpi porrect, about three times longer than wide, pointed and covered with a mixture of long brown and pale yellow hairs. Thorax and scutellum wholly pale gray pollinose and white haired. Abdomen more extensively pale banded, segment 1 pale laterally and below, segment 2 wholly pale.

Distribution. Mexico to Northern Argentina and Paraguay. Colombia (Choco, Antioquia, Valle, Putumayo, Boyaca, Meta, Santander, Vaupes).

Material examined. Mexico, 1♀. Guatemala, 1♀. Costa Rica, 1♀ Panama, 10♀♀ 3♂♂. Venezuela, 1♀. Trinidad, 3♀♀. Paraguay, 1♀. Brazil, 4♀♀. Colombia: Choco; La Teresita, 1♂ 8 March 1967, 1♀ 26 May 1967, D. G. Young coll; Valle; Rio Zabaletas, 4km E Zabaletas, netted, 2♀♀ 6 July 1975, 8♀♀ 18 Aug. 1975; Lower Anchicaya, 1♀ 7 Nov. 1975; Putumayo; Puerto Asis, CO₂ baited flight trap, 1♀ 15 April 1976; Meta; Villavicencio, 1♀ Sept. 1940, 1♂ 21 Dec. 1941, 1♀ 29 Aug. 1941.

Discussion. The specimen from Putumayo and 1 of the 3 from Villavicencio differ in coloration from the others by having yellow

orange beards and lateral margins of the mesonota and pleura. In addition the white portion of the tibiae are yellowish instead.

C. Porter (pers. comm. 1976) collected 198 of this species in the Providencia and Caucasia region of Antioquia biting horses or mules. They bit throughout the day but were most active between 1500 and 1700hrs. Fairchild (1942d) reported them to fly year-round. Porter also observed this but found most between April and July.

Goodwin and Murdoch (1974) reared 80 specimens from various localities in Panama from decaying logs and cavities in trees and posts.

Bequaert and Renjifo (1946) list the following records from Colombia: Boyaca; Guaquaque; Meta; El Caibe, Rio Negro, 20km S of Villavicencio, Restrepo and Villavicencio; Santander; Rio Negro; Valle; Hacienda la Carmelita on the Rio Frio; Vaupes; between San Jose del Guaviare and Calamar.

Leucotabanus flavinotum (Krober)

Tabanus flavinotum Krober 1934, Rev. Ent. 4(3):309, new name for *Tabanus nigriflavus* Krober 1931, not Krober 1930.

Leucotabanus flavinotum: Fairchild 1941, Ann. Ent. Soc. Amer., 34(3):632, fig. 1, ♀, Panama, references; 1956, Smiths. Misc. Colls. 131(3):16, type seen; Goodwin and Murdoch, 1974, Ann. Ent. Soc. Amer., 67(1):108, figs. 15, 29.

A small robust species with a bright yellow mesonotum, wholly black legs and abdomen, and hyaline wings.

Female. Length 8-10mm (N=15, \bar{x} =9.1mm). Frontal index 4.4-6.1 (\bar{x} =5.4). Frons pale grayish yellow pollinose. Ocellar tubercle at vertex slightly raised, bears 3 distinct ocelli. Callus reddish brown,

wide but not touching sides of frons, narrows gradually to a point below the tubercle. Eye color black in life. Fairchild (pers. comm. 1978) has reared the species and noted the eye color. Subcallus shiny reddish brown or at most with some grayish pollinosity around the edges. Genae and frontoclypeus grayish brown pollinose, the beard of short dark brown hairs. Antennal segments 1 and 2 yellowish brown with a mixture of dark brown and reddish hairs. Segment 3 pale yellowish brown, the dorsal angle of the flattened basal plate obtuse. Palpi black covered with numerous black hairs. Proboscis dark brown pollinose, labella wholly fleshy.

Mesonotum and scutellum pale grayish yellow pollinose covered with bright yellow hairs. Pleura and coxae blackish brown with sparse grayish pollinosity, the vestiture sparse dark hairs except for a large bright yellow tuft in front of wing base. Legs blackish brown with dark brown hairs, the tibiae and tarsi somewhat paler. Basicosta setose. Wings hyaline, the venation normal.

Abdomen black, covered with numerous short dark reddish brown hairs. Below segments 1 and 2 with sparse silver gray pollinosity and silvery white hairs.

Male. Easily associated with female. Eyes holoptic, the larger upper facets occupy three-fourths of the eye and are well demarcated from the small facets below. Palpi porrect, dark brown, covered with long dark brown hairs, about three times longer than wide and with a curved pointed tip.

Distribution. Costa Rica to Colombia (Choco, Antioquia, Boyaca), Venezuela, Brazil.

Material examined. Panama, 22⁰⁰~~+~~ 1♂.

Discussion. C. Porter (pers. comm. 1976) collected 177 specimens biting horses and mules in the Providencia region of Antioquia. Although caught during all daylight hours the peak activity was between 1400 and 1800hrs. The flight season lasted between February and October with a peak in July.

Goodwin and Murdoch collected 27 larvae and raised 20 to adult from 3 locations in Panama. All were collected from decaying logs and soil around bases of trees, as have been other known species of the genus. In addition Bequaert and Renjifo (1946) report specimens from Boyaca; Muzo.

Fairchild (unpublished 1978) states this species seldom attacks man but feeds readily on horses and cattle.

Genus *Lepiselaga* Macquart

Lepiselaga Macquart 1838, Dipt. Exot., 1(1):153. Krober 1929, Encycl. Ent. Ser. B, 2, Dipt. 5:136. Fairchild 1965, Psyche, 72(3): 215-217, figs. 2-5, key.

Members of this genus are small usually black species with basally black wings, a constricted discal cell, swollen tibiae, and shiny flattened palpi. The species found in the study area is the only member of the subgenus *Lepiselaga* while there are 3 species in the other subgenus, *Conoposelaga*, of which one is known only from eastern Colombia, outside the area of this study.

Lepiselaga crassipes (Fabricius)
(Figs. 92, 93)

Haematopota crassipes Fabricius 1805, Syst. Antl., p. 108, no sex, South America.

Lepiselaga crassipes: Fairchild 1940, Psyche, 47(1):8-13, figs. 1-5, early stages; 1942, Ann. Ent. Soc. Amer., 35(3):291-292, fig. 2, full references. Goodwin and Murdoch 1974, Ann. Ent. Soc. Amer., 67(1):106, figs. 22, 29.

A small shiny black species with a wide frons, shiny frontoclypeus, swollen palpi and tibiae, black legs with white tarsi, iridescent green scale-like hairs over entire body, and wings with basal two-thirds black with occasional small white spots.

Female. Length 6.0-7.5mm (N=20, \bar{x} =6.6mm). Frontal index 1.7-2.2 (\bar{x} =2.0). Frons brown pollinose except for thin lateral silver gray pollinosity below. Vestiture mostly iridescent green scale-like hairs. Callus shiny blackish brown not touching sides of frons, short about

two times wider than high. Eyes greenish black with a thin bright green semicircle reaching along the upper border and near the lower border and a thin median purple black stripe. Subcallus shiny pale yellowish brown in specimens from the Cauca Valley and shiny black in those from the coast (Guapi). Genae and frontoclypeus shiny black. Beard of sparse blackish brown hairs. Antennae pale yellowish brown, segment 1 shiny, the others pale yellow pollinose; antennal hairs sparse and black. Basal plate about 3 times longer than annuli, widened toward the base without a distinct dorsal angle. Palpi shiny black, flattened, only twice as long as wide with sparse thin dark hairs. Proboscis short with a large, wholly fleshy labella.

Mesonotum and scutellum blackish with dark brown pollinosity and numerous iridescent green scale-like hairs. Pleura as mesonotum but with fine reddish brown hairs. Legs shiny blackish. Protibiae incrassate, the others somewhat swollen. Tarsi white, protarsi dusky apically. Basicosta bare. Wing as figured, blackish basally.

Abdomen as thorax in coloration, and vestiture with fine dark hairs intermixed with the green scale-like hairs. Tip of abdomen pointed.

Male. As female, holoptic, lower fourth of small facets poorly demarcated from the larger facets above. Palpi quite large and swollen. Males hairier, with slender long hairs more numerous than in the females.

Distribution. Mexico to northern Argentina, Cuba, Jamaica, Hispaniola, Puerto Rico. Colombia (Choco, Valle, Cauca, Antioquia, Cordoba, Amazonas).

Material examined. Mexico, 1[♀]. Puerto Rico, 1[♀]. Costa Rica, 1[♀]. Guatamala, 1[♀]. Belice 2^{♀♀}. Surinam, 1[♀]. Panama, 4^{♀♀} 2♂♂. Paraguay, 1[♀]. Brazil, 3^{♀♀}. Bolivia, 3^{♀♀}. Colombia: Amazonas; Santa Sophia Island, on Amazon River near Leticia, 5^{♀♀} 27 July 1973; Cordoba, Monteria, 1[♀]; Choco; Atrato River, 1[♀] 6 Dec. 1967; Valle; Municipio de Candelaria, near Cali, numerous specimens from all months of the year.

Discussion. *L. crassipes* was taken during CO₂ baited flight trap and horse-baited biting studies. Peak activity times were between 1300hrs and dusk. When biting nearly all were taken on the underside of the belly. They are fierce biters and will readily attack man, usually around the legs and ankles.

The larvae live on floating aquatic plants in all types of bodies of water. They are commonly associated with *Pistia* (water lettuce). Goodwin and Murdoch (1974) report that in Panama "Larvae were taken from around the roots of aquatic plants, from floating mats of water fern, from water lettuce, from surface scum, and from organic soil at the margins of various bodies of water. Pupae were found among leaves of floating plants and in organic soil near the water's edge."

Genus *Poeciloderus* Lutz

Poeciloderus Lutz 1921, Bol. Inst. Osw. Cruz, 1(1):15. Fairchild 1969, Arq. Zool. Sao Paulo, 17(4):220; 1971, Cat. Dipt. S. Amer., 28, p. 85, synonymy.

Poeciloderus is characterized by a swollen forward extending first antennal segment, eyes with 2 green bands, densely pilose in males, bare or pilose in females. A small ocellar tubercle is present and in the 2 species treated here there are clouds on the crossveins and the first posterior cell is closed or coarctate. The abdomen bears a more or less distinct median row of pale triangles, and dorsolateral rows of oblique pale dashes, not forming connected stripes.

Of the 8 described species, 2 were found in the study area, and 1 of these is new.

Key to *Poeciloderus* Species

1. First posterior cell coarctate, rarely closed. Hind femora dark gray, at most extreme apex pale. Venter wholly black in ground color. Callus black to dark brown. Body vestiture black and white hairs. First antennal segment usually black (Fig. 94) *quadripunctatus*
- 1'. First posterior cell always closed and petiolate. Hind femora yellow, at most basal half brown. Venter light brown in ground color, at most with a vague darkening in the middle of sternite 2 and rarely on terminal sternites. Callus brown to yellow. Body vestiture dark brown and yellow hairs. First antennal segment usually brown (Figs. 13D-F, 95). . . *allusiosis*

Poeciloderus allusiosis n. sp.
(Figs. 13D-F, 95)

A medium sized brownish species with grayish yellow beard and pleura, bicolored blackish and pale yellow legs, clear wings with dark brown spots on crossveins, and abdomen brown, marked with median and lateral pale spots.

Female. Length 12mm; of wing 10mm. Frons, antennae, and palpi as figured. Frontal index 4.0. Frons slightly divergent above; pale yellowish brown pollinose with a slightly raised subshiny yellowish brown tubercle at the vertex. Vestiture of very sparse short black hairs. Callus yellowish brown. Eyes moderately pilose with very short hairs; dark blackish purple with 2 iridescent green bands. Subcallus pale grayish yellow pollinose. Genae pale yellow pollinose above, silvery gray below. Frontoclypeus silvery gray pollinose. Vestiture on upper genae sparse and blackish, beard and the sparse hairs on the frontoclypeus pale grayish yellow. Antennal segment 1 pale grayish yellow pollinose, segment 2 yellowish brown, segment 3 yellowish brown basally, the remainder blackish brown; vestiture black. Palpi cream colored with very pale yellow pollinosity, hairs predominantly black but with pale yellow, more slender, hairs intermixed. Proboscis short, half again as long as palpi, grayish brown pollinose; labella fleshy.

Mesonotum and scutellum with blackish brown ground color and brown pollinosity, cream colored and pale yellow pollinose laterally. Vestiture sparse short black and yellowish hairs above, long black hairs laterally, and yellow hairs on either side of scutellum. Pleura and coxae dark brown in ground color, creamy pollinose above, pale gray

pollinose below. Vestiture of sparse pale grayish yellow hairs. Pro-femora blackish brown basally, apical fourth yellow brown, pollinosity pale gray, vestiture predominantly pale yellow with black hairs intermixed. Meso- and metafemora yellowish brown, darker at the base with pale yellow pollinosity and mostly pale yellow hairs. Protibiae pale yellow basally, apical third and protarsi black with concolorous hairs. Meso- and metatibiae pale yellow with concolorous hairs. Meso- and metatarsi blackish brown, dark haired. Halteres with a pale yellow knob and brown stem. Basicosta with setae as numerous and strong as on costa. Wings tinted pale brown, veins lightly margined brown, cross-veins with small brown clouds. First posterior cell petiolate.

Abdomen above yellowish brown on segments 1, 2 and most of 3, dark brown on border of tergite 3 and remainder. All segments pale yellow laterally, segments 1-6 with sublateral pale yellow spots and median narrow pale yellow triangles which nearly reach the preceding segments. The median spots on tergites 1 and 2 stronger and continuous with each other forming an hourglass shaped marking. Vestiture of short black hairs, pale yellow on markings. Abdomen below yellowish brown with a broad ill-defined median dark stripe; pale yellow pollinose with short black hairs. Depending on incidence of light pollinosity appears grayish laterally bordering the median dark stripe.

Male. The males examined are quite similar to the females but a bit more hairy. Palpi and antennae as figured. The eye facets are smallest in a broad band around the border, largest in the middle to the midline. Eyes moderately pilose, with short hairs. The transition between the two facet sizes is gradual and there is no distinct demarcation.

Distribution. Colombia (Valle, Huila).

Material examined. Colombia: Holotype, ♀, Valle, Penas Blancas, 1750m, 10km W Cali, from bait horse, 24 Dec. 1974, R. Wilkerson coll. Paratypes, Valle; Penas Blancas, mostly from horses and livestock but some netted and in flight traps, 15♀♀ 1♂ Aug. 1973, 4♀♀ 9 Oct. 1974, 3♀♀ 27 Nov. 1974, 42♀♀ Dec. 1974, 37♀♀ 1♂ Jan. 1975, 42♀♀ March 1975, 1♀ 23 April 1975, 9♀♀ July 1975, 54♀♀ 11 Aug. 1975, 18♀♀ 8 Oct. 1975, 22♀♀ 27 Feb. 1976, 66♀♀ March 1976; Santa Maria, 1♀ 26 June 1975; Municipio de Candelaria, 1♀ 23 March 1975; Lago Calima, 1♀ 17 Jan. 1976, 3♀♀ 13 March 1976; 3.6km W Queremal, 2♀♀ 14 Feb. 1976; Huila; Finca Meremburg, 1♀ 26 Feb. 1976.

Discussion. Frontal index of paratypes range from 2.9-4.0 ($N=26$, $\bar{x}=3.5$, $1SD=0.33$). Length 10-12mm ($\bar{x}=11.5$). Some specimens are lighter, others darker than the holotype. The most apparent difference, however, is in extent of abdominal markings. The sublateral markings vary from small to large, some well defined, others poorly defined. The median triangles also are small on some and often missing on tergite 3. All have the first posterior cell closed. In most it is petiolate.

P. allusiosis occurs with, and is similar to, *P. quadripunctatus* (Fabricius). *Quadripunctatus* is darker, chesnut brown to black, is usually larger ($\bar{x}=12.0$ mm vs. $\bar{x}=11.5$ mm), has a narrower frons (frontal index $\bar{x}=4.0$ vs $\bar{x}=3.5$), and silver gray genal and pleural pollinosity and hairs instead of grayish yellow.

These two species are easily distinguishable in Valle. There exists over the range of *P. quadripunctatus* (Mexico to Argentina) a great deal of variation and many taxonomic questions remain.

The descriptions of these two species included here therefore may be used reliably only in Colombia.

During 22-12hr daylight captures (Jan. 1975-Feb. 1976) from a bait horse at Penas Blancas, 117 specimens of *P. allusiosis* were taken. It was the most frequently captured species in that area. They were taken at all times of the year and all but 10 were captured with the sun shining. They were attracted to horses most often between 1100 and 1500hrs, but were recorded as early as 0825hrs and as late as 1530hrs. Temperature during capture varied from 18° to 32.5°C, most commonly 22°-29°. RH was 42-90% though generally between 55% and 80%. Although a few attacked the neck region 57% went to the front legs, 39% to the rear legs, the majority at or below the knee.

The name refers to the implied and indirect reference of this species to *P. quadripunctatus*.

Poeciloderus quadripunctatus (Fabricius)
(Fig. 94)

Tabanus quadripunctatus Fabricius 1805, Syst. Antliat., p. 99.

Tabanus (Hypomitra) quadripunctatus: Fairchild 1942, 35(4): 452-453, fig. 8 (full references).

Poeciloderus quadripunctatus: Fairchild 1971, Cat. S. Amer. Dipt., Fasc. 82, p. 86, synonymy. Goodwin and Murdoch 1974, Ann. Ent. Soc. Amer., 67(1):116, fig. 36.

Poeciloderus quadripunctatus var. *amabilinus* Philip 1960, Proc. Calif. Acad. Sci. (4), 31(3):89.

A medium sized chestnut brown to blackish species with a grayish beard, silvery gray pleura, tricolored silvery gray, light brown, and

black legs, wings tinted brown with dark brown markings on crossveins, and abdomen marked above with pale sublateral and median spots.

Female. Length 9-13mm (N=40, \bar{x} =12.0mm). Frontal index 3.5-4.4 (\bar{x} =4.0). Frons nearly parallel sided, yellowish brown pollinose with short sparse black hairs. Callus small, yellowish brown to black, subquadrangular, not touching sides of frons. Median callus a thin line, indistinct in some. Vestiges of tubercle at vertex, slightly raised, ocellar area subshiny. Eyes pilose with sparse short hairs; deep purple with 2 metallic green bands when relaxed. Subcallus pale yellowish brown pollinose. Genae and frontoclypeus silver gray pollinose with concolorous beard and frontoclypeal hairs. Antennal segment brown to black with pale yellowish brown pollinosity; swollen above, reaching height of dorsal angle; segment 2 small in comparison, pale brown; segment 3 with a marked dorsal angle, blackish brown to black. Palpi swollen basally, white with whitish pollinosity, vestiture mostly short black hairs; basal hairs longer and white. Proboscis short, a third again as long as palpi, labella fleshy.

Mesonotum and scutellum blackish brown with grayish brown pollinosity, light brown with grayish pollinosity laterally. Vestiture of short black and yellowish hairs. Pleura and procoxae silver gray pollinose with sparse concolorous hairs. Meso- and metacoxae dark brown. Femora dark brown in ground color and silver gray pollinose with concolorous hairs. Tibiae mostly pale yellowish brown with pale hairs. Apical third of protibiae, tips of meso- and metatibiae, and tarsi dark brown with dark hairs. Wings tinted brown with blackish brown clouds on crossveins. First posterior cell coarctate to closed.

Abdomen chestnut brown to black with a median narrow hourglass shaped pale yellow marking on tergites 1 and 2; sides of each segment pale yellow; sublateral and median small pale yellow spots on all segments. Vestiture of short black hairs with pale hairs on pale areas. Below abdomen dark brown with a broad dark grayish brown pollinose median stripe and pale grayish brown lateral stripes with sparse concolorous hairs.

Male. Matches description of female well. The smaller eye facets are in a broad, poorly demarcated outer band, larger ones mesially and along midline. Eyes more pilose than female, with numerous short hairs. Palpi porrect, ovoid with silvery white pollinosity and short black and long pale yellow hairs.

Distribution (Nominate form). Mexico to Argentina. Colombia (Valle, ?Antioquia, Cauca, ?Meta); (var. *amabilinus* in Colombia) Antioquia, Putumayo, Amazonas.

Material examined. (Nominate form.) Colombia: Valle; Penas Blancas, most from bait horses but some netted and caught in flight traps, 2[♀] Aug. 1973, 4^{♂♂} Dec. 1974, 8^{♂♂} Jan. 1975, 8^{♂♂} Feb. 1975, 5^{♂♂} March 1975, 1[♀] 23 April 1975, 4^{♂♂} May 1975, 1[♀] 17 June 1975, 1[♀] 30 July 1975, 4^{♂♂} Aug. 1975, 1[♀] 3 Sept. 1975, 1[♀] 27 Feb. 1976, 6^{♂♂} March 1976; Cali, netted, 1[♂] 13 June 1975; 41km E. Buenaventura, flight trap baited with CO₂, 3^{♂♂} 22 Nov. 1975; Lago Calima, 1[♂] 23 July 1975, 1[♀] 10 Oct. 1975, 1[♀] 26 March 1976; Rio Zabaletas, netted and in flight trap, 2^{♂♂} 3 June 1975, 1[♀] 5 July 1975, 8^{♂♂} 18 Aug. 1975, 3^{♂♂} 19 Oct. 1975; Cauca; Guapi, flight trap, 1[♀] 10 May 1976. Variety *amabilinus*. Colombia; Putumayo; Mocoa, flight trap with CO₂, 1[♀] 15 April 1976; Puerto Asis, flight trap with CO₂, 1[♀] 15 April 1976; Amazonas; 17km W Leticia, flight trap, 1[♀] 25 July 1973.

Discussion. Two fairly distinct forms of *P. quadripunctatus* have been taken in Colombia. Variety *amabilinus* is quite similar to the nominate form here described except that the border of sternite 1 and sometimes the entire second sternites are pale, though commonly some dark coloration remains.

Dr. G. B. Fairchild and I have examined material of the nominate form from Panama and the Pacific side of the Andes and of variety *amabilinus* from Panama, Antioquia, and the Amazon side of the Andes. This suggests to us that two species may be involved, one Pacific, the other Amazonian, both of which occur in Panama.

I will not attempt to resolve this problem here since there is a great deal of variation over the entire species range and insufficient material exists to draw reliable conclusions.

C. Porter (pers. comm. 1976) found only variety *amabilinus* in the Providencia region of Antioquia. Bequaert and Renjifo (1946) report the nominate form from: Antioquia, Medellin; Meta, Villavicencio; and Valle del Cauca, Tres Esquinas, Habana, Buga, and Buenaventura. They report var. *amabilinus* from Meta, Restrepo. Goodwin and Murdoch (1974) took a larva of *P. quadripunctatus* from soil in Panama.

Specimens taken by me at Rio Zabaletas are slightly different from those taken at Penas Blancas. For the most part the above description is a composite of the two. The Rio Zabaletas material is darker, very dark brown or black, hairier, and has a narrower frons, frontal index 4.0 (1SD=0.26) vs 3.6 (1SD=0.30) for Penas Blancas specimens. More data are required to elucidate the relationship of these two forms.

A horse baited biting study resulted in the capture of 3 specimens at Penas Blancas, 1 in Jan. 1976, 2 in May 1975. They were caught

between 1300 and 1520hrs during sunny conditions and temperatures of about 27°C. Two were biting the knee of the front leg, the other the upper rear leg.

Genus *Tabanus* Linnaeus

Tabanus Linnaeus 1758, Syst. Nat. Ed. 10. 1:601. Fairchild 1971, Cat. S. Amer. Dipt. Fasc. 28, p. 87, synonymy.

The genus *Tabanus* is characterized by bare eyes, lack of ocellar tubercle (except for *pungens*), unsclerotized labella, basicosta with numerous setae, and unpatterned wings (though they may be fumose or the veins margined).

Key to *Tabanus* Species

1. A prominent black velvety pilose spot covering base of scutellum and adjoining border of mesonotum, usually bordered with paler hairs and pollinosity. 2
- 1'. Without such a prominent spot, though sometimes with a small velvety spot on posterior border of mesonotum 5
- 2(1). With a long appendix at fork of third vein. 3
- 2'. Without an appendix at fork of third vein. Antennal plate black, unusually long and slender. Abdomen yellowish brown, brown haired, with faint slightly paler haired middorsal triangles which are sometimes contiguous, forming a stripe. Eyes in life unicolorous, bronzy. *unipunctatus*
- 3(2). Eyes with 2 narrow green bands, much narrower than the dark interval between them, the lower margin sometimes narrowly green. Mid abdominal pale triangles equilateral or higher than wide, the posterior borders of tergites without pale hairs *pseudoculus*
- 3'. Eyes with 3 broad green bands, the upper 2 sometimes confluent at outer ends, the lower margin of the eye always dark.

- Midabdominal triangles broader than high, the posterior borders of tergites paler and pale haired 4
- 4(3'). Blackish with largely black femora *albocirculus*
- 4'. Reddish with largely pale femora. *albocirculus* variety
- 5(1'). With a more or less prominent black velvety spot on posterior margin of mesonotum, but not on adjoining scutellum 6
- 5'. Without such a spot 8
- 6(5). Abdomen without noticeable pattern, essentially unicolorous pale green or straw colored, wholly yellow haired. Mesonotum gray, largely pale haired. Basal plate of third antennal segment with a moderate acute dorsal angle *olivaceiventris*
- 6'. Abdomen with a pattern due to contrasting vestiture of underlying color or both 7
- 7(6'). Fork of third vein with a long appendix. Abdomen unicolorous brown with a middorsal row of white haired triangles.
. *rubripes*
- 7'. Fork of third vein without an appendix. Abdomen yellowish brown in ground color often with an indistinct dark median stripe, but without median pale triangles *importunus*
8. Third antennal segment with a long curved dorsal spine, reaching or exceeding first annulus. Frontal callus ridge like or clavate 9
- 8'. Third antennal segment with a short to long straight dorsal spine, or acute or obtuse angle, clearly failing to reach first annulus. Frontal callus various. 10
- 9(8). Abdomen bright orange brown with at least traces of a middorsal integumental dark streak or series of elongate spots, black

- haired, without pale hair patches. Sides of abdominal tergites largely black and black haired. Abdominal venter usually with a broad blackish stripe *hirtitibia*
- 9'. Abdomen dark reddish brown without a middorsal dark stripe, at most a faint dark streak on tergite 2. Abdominal tergites 2-5 with golden to coppery haired posterior margins and/or median triangles. Sides of abdominal tergites concolorous with dorsum, largely or wholly pale haired on at least first 5 segments. Venter orange brown, without dark stripe, wholly pale haired *macquarti*
- 10(8'). All legs entirely black. Large predominantly brown species without prominently pale striped abdomens. Frons very narrow, callus ridge like or clavate. 11
- 10'. Legs at least partly brownish or bicolored. Smaller species, usually with prominently patterned abdomens. Frons generally broader, callus not ridge like. 13
11. Wing generally without appendix at fork of third vein, if present it is very short. Frontal callus hardly widened below, almost threadlike, usually black. Beard gray to blackish. Abdomen predominantly dark haired with middorsal orange haired triangles and/or hind marginal bands. sp.
- 11'. Wing with a long appendix at fork of third vein, as long or longer than short subtending segment of third vein. Frons slightly wider, the callus noticeably widened below, often brown 12
- 12'. Antennae predominantly orange to reddish brown, at most the style darkened. Dorsal spine short and erect, the basal plate

- at least twice length of style. First 4 or 5 abdominal segments reddish orange, orange haired, segments 5 or 6-7 blackish, mainly black haired. Tergite 5 often reddish in the middle or anteriorly. *surifer*
12. Antennae predominantly black, at most the base of third segment and dorsal spine reddish. Dorsal spine long and slender, but clearly not reaching end of long basal plate. Abdomen dark red, mainly black haired, but with a variable quantity of dull reddish hairs, generally forming a broad to narrow, even or irregular, middorsal stripe *thiemeanus*
- 13(10'). Subcallus bare and shiny, at least in part. 14
- 13'. Subcallus pollinose unless denuded by wear 16
- 14(13). Abdomen with a thin pale middorsal stripe and wide sublateral stripes made up of a series of oblique pale marks. Frons wide, frontal index 3.3-4.1 (\bar{x} =3.7). Wings glass clear except for slight darkening around stigma *claripennis*
- 14'. Abdomen with a single slender middorsal stripe, with or without a pair of slender lateral stripes. Frons narrow, frontal index 8.0-12.0. Wings smoky along costal margin. 15
- 15(14'). Abdomen black or dark brown with a single prominent white middorsal stripe covering tergites 1-6. Annuli black, contrasting with yellow orange basal plate *unistriatus*
- 15'. Abdomen brown to dark brown with a thin middorsal pale stripe and thin pale dorsolateral stripes. Annuli somewhat darker but not contrasting with basal plate. *aniptus*
- 16(13'). Vertex with a small, discrete raised tubercle. Frons wide, frontal index less than 4.0, the callus as wide as high, yellow.

- Abdomen with a narrow, even or irregular, pale median stripe overlying a broad black integumental stripe. Dorsolateral stripes of broad, pale oblique contiguous patches. All femora pale, wings glass clear, the fourth posterior cell broadly open. *pungens*
- 16'. Vertex without a tubercle, at most a small shiny bare area. 17
- 17(16'). Protibiae prominently bicolored, the basal half to two-thirds pale, white haired, the terminal remainder black haired. Abdomen with a strong median and, at least vestiges of, dorso-lateral pale stripes 18
- 17'. Protibia unicolorous or weakly bicolored, the paler basal portion not white haired. Abdomen with or without median and dorsolateral stripes, when present stripes are weak and/or diffuse 21
- 18(17). Midabdominal stripe a series of narrow connected triangles. Sublateral stripes a series of oblique pale marks. Wings with faint clouds on crossveins and fork of third vein. *commixtus*
- 18'. Midabdominal stripe of even width throughout, rarely slightly irregular. Wings without clouds on crossveins or at fork . . 19
- 19(18). Hind femora nearly entirely pale, at most slightly dusky at base. Scutellum reddish, at least at apex. Costal cell generally water clear. Abdominal stripes broad, yellow to yellowish white, the dorsolateral stripes usually well developed at least to tergite 4 *dorsiger* var. *dorsovittatus*

- 19'. Hind femora largely black or at least the basal fourth sharply black. Scutellum black. Costal cell yellow or brown tinted. Abdominal stripes usually narrower, the dorsolaterals generally not reaching tergite 4. 20
- 20(19'). Hind femora nearly wholly black. Abdomen black with narrow median white or yellowish white stripe. Dorsolateral stripes whitish, often reduced, rarely absent. Venter black, whitish pollinose and sparsely white haired . . . *dorsiger* var. *modestus*
- 20'. Hind femora sharply black for at least basal fourth. Abdomen dark brown to nearly black, the median stripe broader than var. *modestus*, dark to light yellow, the dorsolaterals broad to narrow, yellow, rarely reaching tergite 4, occasionally absent. Vestiture of venter rich yellow to yellowish white, the integument light brown with a black patch on sternite 2 or broad median dark stripe *dorsiger* var. *stenocephalus*
- 21(17'). No median abdominal pale stripe but a black integumental triangle on tergites 1 and 2, sometimes continued as a stripe to tergites 3 or 4. Abdomen with broad orange haired dorso-lateral stripes. All femora at least basally black. Wings evenly tinted, only the costal cell darker. *praeteritus*
- 21'. A more or less distinct middorsal pale abdominal stripe. No black integumental triangle on abdominal tergites 1 and 2. All femora pale, unicolorous. Wings with veins brown margined. 22
- 22(21'). Middorsal abdominal stripe broad and diffuse, dorsolateral stripes absent. Antennae and palpi very slender and acutely

- pointed. All wing veins heavily brown margined (Fig. 97) . . .
 *eldridgei*
- 22'. At least vestiges of abdominal dorsolateral stripes present.
 Middorsal stripe slender and clearcut but often faint.
 Antennae or palpi stouter 23
- 23(22'). Small slender species, 7-10mm long. Antennae moderately broad
 but palpi slender and mostly black haired. Dorsolateral
 abdominal stripes broad, the middorsal stripe narrow. Frontal
 callus nearly round, about as wide as high. Frontal index
 2.9-3.6 *nereus*
- 23'. Larger species, 10-13mm long. Antennae slender but palpi
 basally inflated and mostly silvery white haired. Dorso-
 lateral stripes absent or represented by a few pale hairs.
 Frontal callus distinctly higher than wide. Frontal index
 3.7-5.0 (Figs. 13J-L, 96) *quapiensis* n. sp.

Tabanus albocirculus Hine

Tabanus albocirculus Hine 1907, Ohio Nat., 8(4):227, ♀, Tucurrique,
 Costa Rica. Fairchild 1971, Cat. S. Amer. Dipt. Fasc. 28 p. 88,
 synonymy. Goodwin and Murdoch 1974, Ann. Ent. Soc. Amer., 67(1):128,
 figs 16, 37.

Tabanus (Bellardia) albocirculus: Fairchild 1942, Psyche, 49(1-2):
 11-12, figs. 4, a, b, Panama. Fairchild 1946, Ann. Ent. Soc. Amer.,
 39(4):575-576, Almirante and Robalo, Bocas del Toro, Panama.

Tabanus (Lophotabanus) albocirculus: Fairchild 1953, Proc. Ent.
 Soc. Washington, 55(5):241.

A medium to large reddish brown to dark grayish brown species with a black haired spot on the posterior mesonotum and scutellum surrounded by white hairs, legs bicolored black and reddish brown, wings without a pattern but tinted brown costally and on vein margins, and abdomen with middorsal silvery white hair triangles on tergites 2-5.

Two forms may be distinguished based primarily on color. Since the original description is of a dark specimen the following redescription is of the darker Western Colombian form which is compared to the paler form in the discussion section.

Female. Length 14.5-18mm (N=16, \bar{x} =15.8). Frontal index 7.4-10.3 (\bar{x} =9.0). Frons convergent below, 0.58-0.77 (\bar{x} =0.67) times as wide at the base as at the vertex. Frons dirty grayish yellow pollinose, subshiny at the vertex, vestiture of short black hairs, most numerous above. Callus dark brown, broadened below, nearly touching the sides of the frons at the base, extending above in a narrow ridge, slightly wider in the middle, which reaches two-thirds the distance to the vertex. Eyes with three metallic green stripes on a dark purple background. Subcallus and upper genae grayish yellow pollinose. Genae and frontoclypeus silvery gray pollinose with pale grayish white hairs. Antennal segments 1 and 2 yellowish brown with numerous short black hairs. Segment 3 dark brown, the basal plate somewhat elongated with a small slightly acute dorsal angle; annuli are pointed about half as long as the plate. Palpi pale cream colored, somewhat swollen basally, and bluntly pointed. Vestiture is of numerous short black hairs. Proboscis is compact dark brown pollinose with large wholly fleshy labella.

Mesonotum dark brown in ground color, slightly paler laterally with sparse bluish gray pollinosity. A prominent black circular spot is formed by dark integument and short black hairs on the scutum and anterior scutellum, which is surrounded by a ring of pale gray pollinosity and silvery white hairs. Pleura and coxae gray pollinose with predominantly pale grayish white hairs. Femora dark reddish brown. Protibiae with the basal half to two-thirds white with silvery white hairs, apically black and black haired. Meso- and metatibiae indistinctly bicolored pale reddish brown and black. All tarsi black. Wing unpatterned tinted brown costally and on vein margins. Fork of third vein with a long appendix and first posterior cell coarctate.

Abdomen above blackish brown with short black hairs. Posterior borders of tergites 2-5 pale bluish gray pollinose with silvery white hairs. This border is expanded somewhat laterally and forms triangles middorsally which are from one-fourth to one-half segmental height. Below abdomen is blackish brown with bluish gray pollinosity; vestiture is of silvery white hairs on sternites 1 and 2, sternite 3 has a few black hairs basally which increase on succeeding segments until sternites 6 and 7 are wholly black haired.

Male. No dark form males have been collected. Fairchild (unpublished 1978) states "The few males collected have all been light or intermediate in color, and are easily associated with the female. The eyes have the area of large facets small and triangular, less than half the eye area, and the facets not greatly enlarged. There is a tubercle at vertex between the eyes, reaching eye level; the palpi are oval, inflated, porrect, and the body more hairy than the female, with the abdominal middorsal triangles smaller and less distinct."

Distribution. Nicaragua, Costa Rica, Panama, Ecuador, Colombia (Choco, Valle, Cauca).

Material examined. (Dark form) Panama, 10^{♀♀}. Colombia: Choco; Curiche River, 1[♀] 16 April 1967, 1[♀] 29 May 1967, 1[♀] 27 June 1967, 1[♀] 11 July 1967, D. G. Young coll; La Teresita, 1[♀] 16 Sept. 1967, D. G. Young coll; between Rio San Juan and Rio Baudó, netted, 1[♀] 23 Feb. 1976; Valle; Bajo Calima, flight trap baited with CO₂, 12^{♀♀} 5 Sept. 1975; Rio Zabaletas, 4km E Zabaletas, netted, 1[♀] 6 July 1975; Cauca; Guapi, flight trap with CO₂, 1[♀] 10 May 1976. (Pale form) Costa Rica, 1[♀]. Panama, 28^{♀♀}, 5♂♂. Ecuador, 2^{♀♀}. Colombia: Choco; La Teresita, 1[♀] "1-6-67," 1[♀] 23 Aug. 1967, D. G. Young coll; Andagoya, 1[♀] 24 Aug. 1940, Otoyá coll; Valle; Rio Raposo, 1[♀] 14 Oct. 1962, C. J. Marinkelle coll; Rio Zabaletas, 4km E Zabaletas, netted, 2^{♀♀} 18 Aug. 1975, 1[♀] 19 Oct. 1975; Bajo Calima, 1[♀] 5 Sept. 1975, CO₂ baited flight trap; Cauca; Guapi, CO₂ baited flight trap, 27^{♀♀} 9 Feb. 1976, 47^{♀♀} 10 May 1976.

Discussion. In the Colombian specimens examined, I found no morphological differences to separate the dark and paler forms. Intermediates were also collected which are difficult to assign to either group. In comparison with the dark form described above the frons of the pale form is slightly narrower (N=20, \bar{x} =9.6), the antennal basal plate is reddish brown, the mesonotum and legs are paler, and the abdominal ground color is reddish brown, dusky on the last few segments. No differences in vestiture are noted. Most light forms were captured in a mangrove swamp and most dark forms further inland which suggests environmental influence on color variation, if in fact these forms are conspecific. Fairchild (unpublished 1978) in Panama found the dark

forms primarily in areas of high rainfall and mostly on the Atlantic coast and the paler forms mostly on the drier Pacific coast.

T. albocirculus apparently does not occur east of the Andes.

Lee et al. (1969) considered *T. albocirculus* and *T. xipe* (=antarcticus) together. They reported taking 42 specimens in the Rio Raposo and nearby areas, mainly at human and livestock bait. They probably had before them pale and dark forms of *T. albocirculus*. *T. antarcticus* is evidently found only east of the Andes. Fairchild (unpublished 1978) states "*Albocirculus* is very similar to *T. antarcticus* (Linn.) (=xipe Krober) but the latter has the male eye with strongly differentiated large facets, the wings usually with faint clouds around cross-veins and fork of third vein, more intense than the general wing infuscation, and the frons of the female is slightly broader, on the average." Fairchild (1953) found only 0.12% in arboreal collections in Panama.

The larva of this species was described by Goodwin and Murdoch (1974) without habitat data.

Tabanus aniptus Fairchild

Tabanus aniptus Fairchild 1976, Studia Ent. 19(1-4):242-244, fig. 1.

Tabanus trivittatus: Lee, Fairchild and Barreto 1969, Caldasia, 10(49):455, not Fabricius, 1805.

A small brownish species with a bare subcallus, usually wholly orange antennae, prothoracic legs black with the base of the tibiae white, and abdomen with three faint stripes.

Female. Length 8-9.5mm (N=20, \bar{x} =8.7mm). Frontal index 8.0-11.8 (\bar{x} =9.3). Frons convergent below, 0.4-0.7 times as wide at base than at vertex.

The original description of Fairchild follows my additional observations below.

Eyes bare in life, dark purple with three metallic green stripes, the top 2 narrowly joined laterally. Frontal callus small, irregularly rectangular, touching sides of frons. Median callus above a narrow ridge reaching about half distance to the vertex. Antennal basal plate large with a distinct but obtuse dorsal angle. Palpi inflated basally tapering gradually to a blunt point.

Frons yellowish grey pollinose, the middle third distinctly darker, brown. Frontal and median calli black, subcallus brownish yellow, very little inflated. Face and cheeks silvery grey pollinose, beard white. Antennae dark orange, first segment thinly pale pollinose, black haired; third wholly orange, the style very slightly darker. Palpi pale, white pollinose, largely black haired, but with white hairs at base and below.

Mesonotum and scutellum blackish brown, faintly striped, dark grey pollinose, beset with erect dark hairs and recumbent shining golden and greenish-iridescent flattened hairs. Notopleural lobes concolorous, black haired. Pleura and coxae blackish, thickly grey pollinose, white-haired. Fore femora black, black haired, mid and hind femora orange brown with some blackish shades on basal half, white haired. Fore tibiae bicolored, the basal half dull yellow, pale haired, the distal half black and black haired. Mid and hind tibiae yellow orange, mainly yellow haired, except black haired at apices and posterior surfaces of hind pair. All tarsi brown to black, black haired. Wings with normal venation, no appendix, stigma brown, whole wing lightly brownish tinted, the costal cell yellowish. The marginal and first submarginal cells somewhat brownish infuscated.

Abdomen dull yellowish brown in ground color on first 3 segments, becoming black on remainder. Median stripe slender, faint, dull yellowish pollinose and marked by few and scattered yellow hairs, visible on tergites 1-4, and faintly indicated on 5 and 6 by a few pale hairs on hind margins of segments. Lateral stripes of about equal width and equally faint, barely visible on tergite 4. When viewed from behind, the stripes are more visible as grey pollinose stripes as far as the sixth tergite, not widened on hind margins. Extreme sides of tergites 1-5 with fringes of yellowish white hairs; otherwise dorsum black haired. Venter entirely pale pollinose and white haired. Holotype ♀, Rio Raposo, Buenaventura, Colombia, 26 Aug. 1964, at light. (1976, pp. 242-243)

Male. As female but paler overall. Eyes contiguous with no ocellar tubercle at vertex. Area of large facets occupies about two-thirds to three-fourths of upper eye and blends evenly with the much smaller facets below. The area of the small facets is purple with a single thin metallic green stripe. Antennae are as in female but thinner. Palpi are porrect, oval, about twice as long as wide, and pale yellow with long white hairs with a few intermixed black hairs. Abdomen pale yellowish brown, the stripes less distinct than female, vestiture is of longer less numerous hairs than female, the pale yellow hairs more extensive laterally and on the stripes; in addition it has some pale yellow hairs on the apical margins of tergites 1-5.

Distribution. Panama to Ecuador. Colombia (Choco, Valle, Cauca).

Material examined. Panama, 1♀. Ecuador, 1♀. Colombia: Choco; Curiche River (paratype), 1♀ 6 Sept. 1967; Valle; Rio Raposo (paratypes), netted and from light trap, 4♀♀ 26 March 1963; Buenaventura (paratype), 1♀ 18 Oct., Lund Univ. Chile expedition; Guayabal (paratype), Rio Cajambre, 1♀ no date; Ladrilleros, 30km N Buenaventura, flight trap, 1♀ 23 Jan. 1975; Cauca; Guapi, some netted most CO₂ baited flight trap, 108♀♀ 1♂ 9 Feb. 1976, 55♀♀ 2♂♂ 10 May 1976.

Discussion. Lee et al. (1969) report this species as *T. trivittatus* Fabricius from western Colombia. They captured 6 in the Rio Anchicaya area with human bait, 5 of which were between 1700 and 1800hrs on 7 April 1959 and the other in late morning, 7 May 1959. Other specimens were captured in the Rio Raposo area at human bait, from cattle, from light traps, and by beating vegetation during the months of March, April, May, July, and Aug.

Tabanus claripennis (Bigot)

Atylotus claripennis Bigot 1892, Mem. Soc. Zool. France

5:675.

Tabanus claripennis: Fairchild 1971, Cat. S. Amer. Dipt. Fasc. 28, p. 89, synonymy.

Tabanus hookeri Knab 1915, Insec. Insc. Menstr., 31(1-4):48.

A small to medium brown and yellowish brown species with silvery white palpi, shiny yellowish brown subcallus, indistinctly bicolored pale reddish brown and black legs, and abdomen above brownish with a narrow pale median stripe and irregular broad pale sublateral stripes.

Female. Length 9.5-11mm (N=20, \bar{x} =10.4). Frontal index 3.3-4.1 (\bar{x} =3.7). Frons 0.6-0.7 times narrower below than at vertex (\bar{x} =0.62). Below is the original description of Knab (1915) reprinted in Bequaert of *T. hookeri*, a synonym of *T. claripennis*. The female eye has 3 iridescent green stripes on a purple background, the top 2 broadly joined laterally, the male is white in the area of the large facets and with an iridescent green stripe on purple in the area of small facets below. Both males and females have a shiny yellowish brown subcallus which easily distinguishes them from *T. pungens* with which it is sympatric in the study area.

Eyes bare in the female, hairy in the male. Abdomen dorsally with three longitudinal series of pale markings. Wings clear, the posterior cells all widely open, the upper branch of the third vein not appendiculate. Female: General color brownish gray. Frons broad, narrowing gradually toward the antennae, yellowish gray; frontal callosity brown, roughly quadrate, as broad as high and contiguous with eyes, a narrow connected line reaching about one-third the way to occiput. Antennae bright ferruginous; first joint with the dorsal apex black and with many short black hairs; third joint dorsally with a prominent but obtuse basal process, its apex and the

annulate part of the joint black. Palpi yellowish white, with a few scattered black hairs. Face and cheeks clothed with white pollen and hair. Thorax dorsally dark gray and yellowish brown. The latter color mostly laterally and in two narrow subdorsal stripes; scutellum yellow brown tinged with gray; pleurae grayish white and clothed with white hairs; disk of thorax and scutellum clothed with white hair scales and fine black hairs. Abdomen dorsally blackish brown, a median series of yellowish brown contiguous triangular spots, narrow on anterior margins and broadened to posterior margins; on each side, half-way towards lateral margins a series of broad oblique bars of the same color, touching both anterior and posterior margins of the segments, but not the lateral margins; extreme lateral margins with a narrow continuous brownish yellow stripe; the pale markings are overlaid with whitish hair-scales; venter pale ferruginous, tinted with pale gray at the sides, the seventh segment with short erect black bristles. Legs pale ferruginous, with pale gray pruinosity and whitish down, the anterior and middle coxae dark, the front tibiae blackened from just beyond the middle; tarsi blackish. Wings hyaline, the stigma long and brownish yellow. Halteres pale ferruginous, with creamy white knobs. The eyes show traces of two transverse purplish stripes. Length: Body, about 11mm; wings 9mm.

Male. Eyes with the small facets forming a dark band along the lower margin, very broad posteriorly and tapering to a point above antennae. Third antennal joint with the basal process hardly larger than in the female, but distinctly acute. Abdomen with the dorsal markings less distinct, the median stripe obsolete. Length: Body, about 11mm; wings 8.3mm. (1940, pp. 364-365)

Distribution. West Indies, Colombia (?Cordoba, Magdalena, Valle, Cauca, Meta) to Paraguay, Argentina and Chile.

Material examined. Cuba, 1♂. Dominican Republic, 1♀. British Guyana, 1♀ 2♂♂. Trinidad B.W.I., 1♂. Puerto Rico, 1♀. Surinam, 1♀. Brazil, 3♀+ Paragay, 1♀. Bolivia, 1♀. Argentina, 3♀+1♂. Chile, 1♀. Colombia: ?Cordoba; Monteria, 2♀+ 2♂♂; Meta; Barbasal, 1♀ 26 Sept. 1964; Valle; Municipio de Candelaria, Finca San Luis, 4km NE Cali, from horse and human bait, CO₂ baited and unbaited flight traps, approximately 5,000 specimens were collected during all months of the year; Pance CVC, 15km W Cali, alt. 1700m, 1♀ 10 Oct. 1974; Penas Blancas,

1♂ 30 May 1975, 1♀ 27 Feb. 1976; Cauca; Finca Corredor, 20km S Cali,
1♀ 21 Nov. 1974.

Discussion. Twenty-six horse baited captures at "Finca San Luis" near Cali yielded 208 specimens, two-thirds of which were biting on the abdomen and most of the remainder on the lower legs. In addition 20-12hr CO₂ baited flight trap captures produced 528 specimens. Activity began about 0900hrs with a peak at 1500hrs. Temperatures ranged from 19.5-34.5°C with a peak at 27° and the RH ranged from 41% to 86% with peak activity between 58% and 70%.

T. claripennis was caught throughout the year but was less numerous in the months of Nov., Dec., and Jan.

Tabanus commixtus Walker

Tabanus commixtus Walker 1860, Trans. Ent. Soc. London, 5:273 Mexico. Fairchild 1956, Smith. Misc. Colls. 131(3):13.

Tabanus maya Bequaert 1932 (1931), J. New York Ent. Soc., 39: 546, fig. 2, ♀, Yucatan, Mexico. Fairchild 1942, Ann. Ent. Soc. Amer., 35(2):176, pl. 2, fig. 19, ♂, ♀, Panama.

Tabanus truquii: Philip 1965, Ann. Ent. Soc. Amer., 58(6):876. Fairchild 1971, Cat. S. Amer., Dipt., Fasc. 28, p. 103. Goodwin and Murdoch 1974, Ann. Ent. Soc. Amer., 67(1):126, fig. 42, pupa. Not *truquii* Bell.

A medium sized brownish species with faint clouds on the crossveins and fork of third vein, and abdomen with a middorsal stripe of a series of narrow connected triangles and lateral stripes of oblique triangles, the first and second tergites with a dark integumental triangle.

Female. Length 9-13.5mm (\bar{x} =11.6mm). Frontal index 3.9-5.4. Frons convergent below, 0.67-0.91 (\bar{x} =.77) times as wide as vertex. Frons pale grayish yellow pollinose clothed with dark brown hairs, those at the vertex much longer. Basal callus shiny yellowish brown, not touching sides of frons, rectangular, higher than wide. Median callus a slender line reaching about half way to vertex. Eyes with three green stripes on a purple background. Subcallus pale yellow pollinose. Genae and frontoclypeus silvery gray pollinose and white haired. Antennal segments 1 and 2 yellow with black hairs, segment 1 sparsely pale gray pollinose. Segment 3 orange yellow, the annuli brown. Dorsal angle obtuse. Palpi silvery white, black haired except for a few white hairs basally on second segment and entire first segment. Proboscis with theca grayish yellow pollinose and labella dark brown pollinose.

Mesonotum and scutellum dark brown in ground color, dark brown pollinose with a mixture of erect slender black hairs and recumbent scale like shiny yellowish hairs. Pleura and coxae silvery gray pollinose and white haired. Prothoracic legs blackish and dark haired except for distinctly pale yellow and white haired basal halves of tibiae. Meso- and metathoracic legs pale yellow, basal quarter of femora blackish, the tarsi brown. Wing veins brown with very faint clouds on crossveins and fork of third vein.

Abdomen chesnut brown and brown haired with a middorsal stripe of pale yellow pollinose and pale yellow haired slender triangles and 2 sublateral stripes formed by oblique pale pollinose and pale haired marks. Tergites 1 and 2 with a dark integumental triangle. Venter pale yellow brown and pale grayish yellow pollinose, vestiture numerous pale yellow hairs, a few dark hairs on the terminal segments.

Male. As female. Eyes holoptic, the slightly larger facets in a triangular patch with its base on the midline, surrounded by the smaller facets. Palpi porrect, silvery white, about two and one-half times longer than wide.

Distribution. Mexico to Colombia (Choco), Venezuela, Trinidad, ?Argentina, Antilles.

Material examined. Panama, 27^{♀♀} 4♂♂. Nicaragua, 1[♀]. Honduras, 1[♀]. Mexico, 3^{♀♀}. Venezuela, 4^{♀♀}. Martinique, 1[♀]. Colombia: Choco; La Teresita, 1[♀] 13 May 1967; Curiche River, 1[♀] 1967, D. G. Young coll of both.

Tabanus dorsiger Wiedemann

Tabanus dorsiger Wiedemann 1821, Diptera Exotica (Ed. 2), p. 26. Fairchild 1971, Cat. S. Amer. Dipt., Fasc. 28, p. 92, synonymy.

Tabanus dorsiger var. *dorsovittatus* Macquart (as species) 1855, Mem. Soc. Imp. des Sci., de l'Agr. et des Arts Lille, p. 50.

Tabanus dorsiger var. *modestus* Wiedemann (as species) 1828, Auss. Zweif. Insek., 1:146.

Tabanus dorsiger var. *stenocephalus* Hine (as species) 1906, Ohio Nat., 7(2):27.

Tabanus dorsiger is the name used here to refer to a confusing, heterogeneous, ubiquitous, group of flies. They are all of medium size, have a median and a pair of dorsolateral abdominal stripes, the thorax not remarkably marked, the protibiae bicolored, and the subcallus pollinose. The eyes have a purple outer border, median purple stripe, and a diffuse purple triangular area on the border with the frons. The remainder is iridescent green.

The treatment of the subspecies and varieties of this species by Fairchild (1971) is still unsatisfactory, but lacking a better arrangement will be used here, except that subsp. *modestus* and subsp. *stenocephalus* are reduced to varieties insofar as the Colombian material is concerned. There is great variation among specimens of this complex, from nearly wholly black specimens with narrow white stripes, to pale brown with broad yellow stripes. Scutella may be red or black, femora yellow to black, wings completely hyaline to markedly smoky, frons narrow to moderate, parallel sided to convergent below and callus yellow to black, round or higher than wide. Specimens from different localities differ in the degree of pigmentation and in proportion of each variety. Areas of high rainfall and heavy forest tending to produce a preponderance of darker forms. Unlike the situation in Panama, where, according to Fairchild (pers. comm. 1978) the 3 forms are usually quite distinct, in Colombia a high proportion of specimens cannot be unequivocally placed.

Tabanus eldridgei Fairchild
(Fig. 97)

Tabanus eldridgei Fairchild 1973, Proc. Ent. Soc. Washington, 75(3):327-328, fig. 6, ♀, Colombia, Choco.

A medium sized pale yellowish brown and dark brown species with a slender basal plate, legs indistinctly bicolored yellowish brown and brown, wing veins distinctly margined dark brown, and abdomen with a usually indistinct middorsal pale yellow stripe.

Female. The original description of Fairchild is included following these additional observations. Length 9.5-12.0mm (N=20, \bar{x} =10.9mm). Frontal index 3.9-5.9 (\bar{x} =5.0). Frons convergent below,

0.67-0.90 ($\bar{x}=0.78$) times as wide as vertex. Frontal callus rectangular below extended above into a thin slightly raised ridge reaching about half way to the vertex. Third antennal segment slender, the dorsal angle not very prominent and obtuse. Palpi somewhat swollen basally but the apical half slender and bluntly pointed. The width of the abdominal stripe varies from thin and distinct as is the holotype to one-fourth width of abdomen and rather diffuse.

Eyes bare, in life green with single purple band above middle and lower margin broadly purple. Frons about 5 times as high as width at base, narrowed below, as figured, orange brown pollinose and with scattered erect dark hairs. Vertex with slightly paler, greyish discolored spot. Frontal callus narrower than frons, higher than wide, as figured, yellowish brown. Subcallus pollinose, slightly paler than frons. Frontoclypeus and genae yellowish grey pollinose, beard grey. Antennae as figured, orange yellow, first 2 segments beset with black hairs, third slightly darker, style dusky but not contrasting strongly with basal plate. Palpi moderately slender, as figured, yellowish white, beset with black hairs throughout.

Mesonotum and scutellum blackish brown, unstriped, notopleural lobes very slightly paler, thinly brown pollinose and thinly beset with mixed erect black hairs and semi-recumbent shiny golden hairs. Pleura steel grey, whitish pollinose and greyish-white-haired. Coxae pinkish grey, pale-haired. Femora yellowish brown, mainly black-haired, fore pair slightly darker. Fore tibiae obscurely bicolored, basal third yellowish brown, apical 2/3 blackish, all black-haired. Mid and hind tibiae concolorous with femora, black-haired, hind pair without conspicuous fringe. Tarsi dusky, but only fore pair black. Wings with normal venation, no appendix at fork of third vein. Costal cell deep yellow, stigma brown and all veins broadly and heavily brown margined, especially towards wing apex, wing otherwise dusky hyaline. Halteres dull yellow.

Abdomen above with first 3 terga brownish yellow, remainder blackish, subshiny, clothed with black hairs except for narrow paler pollinose middorsal stripe from segments 1 to 6, which is beset with sparse orange hairs on terga 1 to 3. Posterior border of tergum 1 also bears orange hairs in the middle. Beneath the abdomen is yellowish on first 3 sterna, blackish on remainder, pale pollinose, pale haired on first 3 segments, becoming darker posteriorly, not noticeably banded. (1973, pp. 327-328)

Male. Quite similar to female but paler overall. Eyes contiguous, ocellar tubercle small, hidden below eye level. Area of large facets occupies upper two-thirds of eye, small facets below well demarcated, purple with a metallic green stripe in life. Palpi porrect, about three times longer than wide, white with long white hairs. Antennae as female but somewhat more slender. Abdominal segments 1-2 or 1-3 pale yellowish brown, 2-7 or 3-7 brown with a broad middorsal pale stripe. Vestiture as female, the hairs less numerous and longer.

Distribution. Ecuador. Colombia (Choco, Valle, Cauca).

Material examined. Ecuador, 1 σ^0 . Colombia: Choco; Curiche River (includes holotype and 12 paratypes), all 1967, 1 σ^0 22 April, 5 σ^0 May, 2 σ^0 June, 2 σ^0 Aug., 2 σ^0 Oct., 1 σ^0 5 Dec.; Valle; Rio Raposo, (paratypes) Mangrove, 1 σ^0 14 Oct. 1965, 1 σ^0 18 Nov. 1965, V. H. Lee coll; Cauca; Guapi, CO₂ baited flight trap, 77 σ^0 4 σ^0 9 Feb. 1976, 55 σ^0 6 σ^0 10 Oct. 1976.

Tabanus guapiensis n. sp.
(Figs. 13J-L, 96)

A medium sized dull brown species, with whitish palpi slender apically and bluntly pointed, legs pale brown, wing veins margined brown, and abdomen above with a nearly parallel sided thin pale stripe.

Female. Length 13mm; of wing 12mm. Eye metallic green with a thin purple band in life. Frons, antennae, and palpi as figured. Frontal index 4.4. Frons and subcallus grayish yellow pollinose evenly dressed with small curved black hairs. Callus pale reddish brown, drop shaped, the base slightly inflated. Genae and frontoclypeus silvery gray pollinose. Beard and sparse hairs of frontoclypeus white.

Antennal segments 1 and 2 yellowish brown with some pale yellow pollinosity and black hairs. Palpal segment 1 silvery white and white haired. Segment 2 pale yellowish white with black and white hairs, the white hairs figured thinner. Proboscis brown pollinose, wholly fleshy except for small lateral subshiny areas.

Mesonotum and scutellum brown in ground color, grayish green pollinose, paler laterally. Vestiture a mixture of erect black hairs and recumbent golden yellow hairs. There are two small tufts of white hairs just above wing base. Pleura gray pollinose, sparsely white haired except for a few grayish hairs below wing base. Pro- and metacoxae cream colored and white haired. Femora pale yellowish brown and white haired, meso- and metafemora with sparse pale bluish pruinosity. Apices of femora with a few brown hairs. Protibiae pale brown basally, brown apically with corresponding white and brown hairs. Mesotibiae pale brown with a mixture of short pale yellow and black hairs. Metatibiae pale brown with dark brown hairs dorsally, pale yellow hairs ventrally. Tarsi dark brown and dark haired. Halteres pale yellowish brown, apex of knob pale yellow. Wing venation normal, veins distinctly margined brown. Basicosta setose.

Abdominal tergites 1-3 brown in ground color changing to blackish brown at the tip. Pollinosity sparse pale yellowish gray. Mid-dorsally is a distinct thin nearly parallel sided pale, cream colored pollinose stripe along entire length of abdomen. Vestiture is of short black hairs, more numerous on the terminal segments with mostly short yellow hairs on the middorsal stripe. Abdomen below is pale yellowish brown becoming darker on last few segments. Venter bluish

pruinose and evenly covered with short pale yellow hairs with a few black hairs on the last segments. Apices of all sternites pale yellow pollinose.

Male. Not known.

Distribution. Colombia (Choco, Valle, Cauca).

Material examined. Colombia: Holotype, ♀, Cauca; Guapi, CO₂ baited flight trap, 10 May 1976, R. Wilkerson coll. Paratypes. Cauca; Guapi, 2 netted, the remainder from CO₂ baited flight trap in or near mangrove swamps, 65♂♂ 9 Feb. 1976, 14♀♀ 10 May 1976, R. Wilkerson coll; Valle; Ladrilleros, 30km N Buenaventura, flight trap, 1♂ 23 Jan. 1975, R. Wilkerson coll; Rio Raposo, mangrove swamp, 2♀♀ 14 Oct. 1965, V. H. Lee coll; Choco; Curiche River, 1♀ 10 June 1967, 1♀ 12 Nov. 1967; Choco; location not given, 1♀ 13 July 1967.

Discussion. Paratypes agree well with above description. Overall coloration may be paler or darker. The middorsal abdominal stripe in some specimens is parallel sided while others show connected long triangular markings. Lengths of paratypes range from 10-13mm (N=20, \bar{x} =12.2mm) and frontal indices range from 3.7-5.0 (\bar{x} =4.2).

T. guapiensis is similar to *T. nereus* Fairchild. *Guapiensis* is larger (10-13mm vs 7-10mm), has a narrower frons (index of 3.7-5.0 vs 2.9-3.6), and has a single middorsal stripe rather than 3 dorsal stripes.

T. guapiensis is also similar to *T. eldridgei* Fairchild but has much less brown on the vein borders, paler hind tibiae and tarsi, and a usually distinct pale yellow instead of diffuse middorsal pollinose abdominal stripe. Fairchild (1973) discusses 5 specimens at the end of his description of *T. eldridgei*, 3 from Curiche River and 2 from

Rio Raposo. I have examined these specimens and included them among the paratypes of *T. quapiensis*. These are also part of the material reported from Rio Raposo by Lee et al. (1969) as *T. rixator*.

T. quapiensis differs from *rixator* Fairchild in being larger and darker and having stouter palpi, unstriped eyes and darker hind tibiae.

Tabanus hirtitibia Walker

Tabanus hirtitibia Walker 1850, Insecta Saundersiana, Diptera, 1:33. "Colombia."

Tabanus cinnamomeus Schiner 1868, Theil. 2(1,B) (Diptera) p. 90. "South America." Kroeber 1931, Zool. Anz. 96:59, figs. 8, 9.

Dasyommia bogotana Enderlein 1925, Mitt. Zool. Mus. Berlin, 11(2):349. Colombia, Bogota. Kroeber 1929, Zool. Anz. 83:56, fig. 3.

Chelommia fibulata Enderlein 1925, Mitt. Zool. Mus. Berlin, 11(2):382. Colombia, Cartago.

A medium to large dark reddish brown species with a narrow frons, long dorsal antennal spine, blackish legs, unpatterned smoky brown wings, and abdomen variably marked dorsally with a broad or narrow blackish stripe or a series of triangles, and ventrally entirely pale, or marked with a stripe, or broadly darkened.

Female. Length 14-18mm (N=30, \bar{x} =15.7mm). Frontal index 4.7-7.2 (N=55, \bar{x} =5.75). Frons slightly wider above than below, dirty yellowish brown pollinose with sparse short black hairs. Small ocellar tubercle and vestiges of ocelli usually present at vertex. Callus dark brown slightly triangular below not touching sides of frons, extended upward in a thin ridge reaching two-thirds to three-fourths the distance to

the vertex. Eye color not noted. Subcallus, genae, and frontoclypeus grayish yellow brown. Antennal segment 1 grayish with numerous short black hairs above and pale hairs below; segment 2 reddish brown and black haired; segment 3 reddish brown to black, basal plate with a long dorsal spine reaching to at least first annulus. Palpi pale reddish yellow covered with numerous short blackish hairs. Proboscis dark brown pollinose with some small subshiny dark areas on the labella. Beard a mixture of dark gray and pale yellow hairs.

Mesonotum and scutellum blackish brown in ground color, paler laterally, covered with dark yellowish brown pollinosity, vestiture a mixture of short black and golden yellow hairs. Pleura and coxae dark gray pollinose with pale gray and pale yellow hairs. Legs black to dark gray, the pro- and mesotibiae of some reddish brown. Wings unpatterned smoky brown to pale yellowish brown tinted. Fork of third vein with at most a very small appendix.

Abdomen quite variable, ground color most commonly reddish brown but varying from reddish yellow to blackish brown. Middorsally the markings may be a narrow to broad black line or a series of inverted connected or disconnected broad or narrow black triangles. Most specimens are darkened laterally and on last few segments. Vestiture above of short black hairs, 2 specimens examined had small golden yellow hair patches middorsally on tergites 2-4. Below ground color varies from yellow to blackish brown. The markings show continuous variation ranging from dark terminal segments only to a partial or full length stripe which may be well defined or diffuse and in some covering the entire venter. Vestiture below short golden yellow hairs, more numerous along the apical margins and short black hairs in darkened areas.

Male. The single male examined is easily associated with the females. Eyes holoptic with a distinct tubercle at the vertex. Antennae as female but entirely black. Palpi porrect, egg shaped, and grayish black with black hairs. Abdomen above reddish brown with an irregular black stripe. Abdomen below wholly yellowish brown with dark terminal segment.

Distribution. Colombia (Valle, Caqueta), Ecuador, Venezuela, Peru.

Material examined. Peru, 2^{♀♀}. Ecuador, 2^{♀♀}. Colombia: (most from livestock but also netted and in CO₂ baited and unbaited flight traps) Valle; Lago Calima, 8km below dam, 3^{♀♀} July 1975, 18^{♀♀} Aug. 1975, 8^{♀♀} 4 Sept. 1975, 1[♀] 24 Oct. 1975, 1[♀] 7 Nov. 1975, 1[♀] 5 Dec. 1975, 2^{♀♀} Jan. 1976, 8^{♀♀} 13 Feb. 1976, 24^{♀♀} March 1976, 15^{♀♀} 24 April 1976; 41km E, 20km N Buenaventura, 2^{♀♀} 22 Nov. 1975, 3^{♀♀} 5 Dec. 1975; "Rio Bravo - Playa Rica," 15km below dam Lago Calima, 9^{♀♀} Dec. 1975, 1[♀] 17 Jan. 1976, 2^{♀♀} 3 Feb. 1976; Pance CVC, 15km W Cali, 3^{♀♀} 23 July 1975, 1♂ 28 Aug. 1975, 1[♀] 12 Sept. 1975; Penas Blancas, 1[♀] 18 Aug. 1965, 4^{♀♀} Aug. 1973, 3^{♀♀} Dec. 1974, 14^{♀♀} Jan. 1975, 10^{♀♀} Feb. 1975, 4^{♀♀} 5 March 1975, 2^{♀♀} June 1975, 12^{♀♀} Aug. 1975, 3^{♀♀} 27 Feb. 1976, 21^{♀♀} March 1976.

Discussion. As can be seen above much variation exists in the abdominal markings of *T. hintitibia*. It is possible that more than one species is represented in the specimens examined but I could find no correlation of characters to support this idea.

Bequaert and Renjifo (1946) report this species from Caqueta, Florencia, while the types of the synonymous *bogotana* Enderlein and *fibulata* Enderlein were said to be from Bogota (Cundinamarca) and Cartajo (Valle).

Tabanus importunus Wiedemann

Tabanus importunus Wiedemann 1828, Auss. zweifl. Insekt., 1, p. 127, ♀, Brasil. Fairchild 1943, Ann. Ent. Soc. Amer., 35(4):444-445, fig. 2, references; 1971, Cat. Dipt. S. Amer., Fasc. 28, p. 95, synonymy.

A medium to large tan species with short basally inflated pointed palpi, yellowish brown legs which are dusky apically, antennal tooth short and acute, wings hyaline marked faintly with a brown discal band, and abdomen above usually with a diffuse middorsal black stripe.

T. importunus is considered here in key only since it has not been reported in the study area but is found in Panama and eastern Colombia.

Distribution. Panama to Brazil and N Paraguay, Trinidad. Colombia (Tolima, Cordoba, Magdalena, Meta).

Material examined. Panama, 4♀♀ (including 1 compared to type of *T. importunus*). Venezuela, 3♀♀ 2♂♂ (including 1 compared to type of *T. monogramma* Wiedemann). Surinam, 1♀. British Guyana, 2♀♀. Trinidad, 2♀♀. Paraguay, 1♀. Bolivia, 2♀♀ 1♂. Brazil, 7♀♀. Colombia: Tolima; Venadello, 1♂ 5 Jan. 1942, J. Rodriguez coll; Cordoba; Monteria, 1♀ Oct. 1972, A. Betancourt coll.

Discussion. Bequaert and Renjifo (1946) report this species from Magdalena, Aracataca, P. J. Darlington coll; Meta, Restrepo, J. Bequaert coll and El Caibe near Restrepo.

Tabanus macquarti Schiner

Tabanus macquarti Schiner 1868, Reise Novara, Dipt., p. 89, ♀, Colombia. Fairchild 1971, Cat. S. Amer. Dipt. Fasc. 28, p. 96, synonymy.

Tabanus (Chelotabanus) macquarti: Fairchild 1964, J. Med. Ent., 1(2):181-183, fig. 6, references. Panama, Colombia.

A medium to large reddish brown species with a narrow frons, long dorsal antennal spine, pale yellow beard, unicolorous black legs, wing tinted brownish with a small appendix or none, and abdomen mostly black haired with small middorsal pale yellow hair patches on tergites 1-5.

Female. Length 12-17mm (N=12, \bar{x} =15.2mm). Frontal index 6.4-9 (\bar{x} =7.2). The following is Fairchild's description of Panamanian and Colombian specimens.

Cerro Pirre, upper Rio Setiganti, Darien Prov., Panama, 455m, 3-6. II. 1961. Length 18mm; wing 17mm. Eyes bare, unicolorous. Frons narrow, about 7.5x as high as basal width, nearly parallel-sided, dark yellowish grey pollinose. Callus black, club-shaped, about 1/2 width of frons at widest, narrowed above into a slender ridge reaching 2/3 distance to vertex. Vertex with raised discolored spot with vestiges of 3 reddish ocelli. Subcallus concolorous with frons, with a slight brownish tinge in the middle and scattered short pale yellowish hairs on sides. Frontoclypeus and genae pale yellowish grey, more yellowish beneath antennae and along eye borders, densely clothed with yellowish white hairs. Antennal segment 1 orange, grey pollinose, densely beset with recumbent black setae above, long yellow hairs beneath; segment 2 reddish, with black setae above, its dorsal angle produced into a long acute spine; segment 3 reddish at extreme base, otherwise black, its dorsal tooth long, curved, slender, tip slightly recurved, reaching to end of basal plate; style black, upturned, less than 1/2 length of basal plate. Palpi yellowish, whitish pollinose, beset with well-spaced short black hairs, inflated basally, apex acutely pointed. Proboscis blackish, labella long and wholly membranous.

Mesonotum dark blackish brown in ground color, with a faint slender median and pair of slender dorsolateral pale stripes, not apparent in worn material. Scutellum unicolorous, but notopleural lobes paler reddish. Mesonotum and scutellum clothed with mixed black erect hairs and recumbent shiny yellow hairs, thinly greyish brown pollinose. Notopleural lobes with erect black hairs only. Small tufts of golden yellow hairs immediately before wing bases, and on sides of mesonotum between wing bases and

scutellum. Pleura brownish pollinose above, becoming steel grey towards sternum, clothed with dense long yellow to yellowish white hairs, which are mixed with some black hairs, the black hairs being most abundant just beneath the wing insertions, forming a vague dark patch.

Wings with basicosta densely black setose, costa grooved dorsally at base, costa and 1st vein (R) setose above, subcosta with a single row of setae beneath. Fork of 3rd vein with a short appendix in one wing, none in the other. First posterior cell (R4) slightly narrowed. Costal cell brownish, rest of wing moderately brownish yellow tinted, strongest in basal cells, along fore border, and longitudinal veins, with slight intensification at fork of 3rd vein, not forming a well defined spot.

Femora and coxae all black, grey pollinose, dorsally clothed with mainly black recumbent hairs, ventrally with longer silver to brassy hairs, except hind femora, which are completely bare on mesal surface, shiny towards apex. Extreme tips of fore femora ivory white, of the others only slightly reddish. Fore femora dark brown, practically black, short black-haired dorsally, densely short dark rufous-haired beneath. Fore coxae with dense long yellowish white hairs. Mid and hind tibiae dark reddish brown basally, becoming black towards apex, blackhaired except for sparse yellowish hairs ventrally on basal 1/3. Hind tibiae with a strong fringe of longer black hairs on posterior outer aspect. All tarsi black and black-haired.

Abdomen bright reddish orange on tergites 1-4, 5th basally reddish orange, but with a vague dusky area in middle, and sides and posterior border dusky. Remaining tergites blackish. Tergites 1 and 6 with sparse greyish pruinosity, remainder subshiny. Hairs sparse, black, except for a small tuft in middle of tergite 1, narrow hind marginal bands on tergites 2-4, widened into indistinct median triangles, especially on tergite 4, and entire lateral margins of tergites 1-4, which are orange-haired. Beneath, sternites 1-4 are wholly orange, slightly grey pruinose, wholly orange-haired. Sternite 5 is black at extreme sides and there black-haired, otherwise orange and orange-haired. Sternite 6 is black and black-haired, with a narrow fringe of orange hairs on posterior margin. Sternite 7 wholly black and black-haired. (1964, p. 181)

Distribution. ?Guatemala, Costa Rica to Peru and Surinam.

Colombia (Meta, Antioquia).

Material examined. Costa Rica, 1 σ . Panama, 5 σ +. Ecuador, 1 σ . Peru, 2 σ +. Surinam, 1 σ . Colombia: Santander; Rio Suarez, 900-1000m, 10 11-28 Aug. 1946, L. Richter coll; Meta; Villavicencio, San Jose, 1 σ 10 Aug. 1939; Restrepo, 500m, 2 σ 1936.

Discussion. Porter (pers. comm. 1976) collected this species in Antioquia. Lee et al. (1964) reported 6 females and a male from the Rio Raposo area (Valle) which are probably *T. thiemeana* (Enderlein). Its distribution appears to be east of the Andes and north into Central America.

Tabanus nereus Fairchild

Tabanus mereus Fairchild 1943, Ann. Ent. Soc. Amer., (1942) 35(4):446, fig. 9, σ , Panama; 1958, Ann. Ent. Soc. Amer., 51(6):550; 1973, Proc. Ent. Soc. Washington, 73(3):322-323, fig. 3.

A small grayish brown species with a broad frons, yellow callus, palpi white with the apical half slender and bluntly pointed, legs yellowish brown, wing veins brown margined, and abdomen with three faint stripes.

Female. Length 7-10mm (N=20, \bar{x} =8.7mm). Frontal index 2.9-3.6 (\bar{x} =3.3). The following is the original description of Fairchild.

Eyes bare, in life green with a narrow transverse median band and the lower margin purple. Frons moderately broad, about 3 1/2 times as high as wide, very slightly narrowed below, and covered with yellowish brown pollen. Frontal callus rounded to pear shaped, higher than wide, a little more than half as wide as frons, dull yellow. Median callus a short streak unconnected with the basal callus. Vertex tubercle entirely absent. Subcallus greyish brown pollinose, without hairs. Fronto-clypeus and genae grey, sparsely white haired. First and second antennal segments moderately inflated, pale brownish, black haired. Basal part of third segment reddish, longer

than broad and longer than the concolorous annulate portion; dorsal angle well marked but obtuse. Palpi white, somewhat inflated basally, the apical two thirds very slender, blunt pointed and almost spatulate or clubbed, hairs mostly black and rather long. Proboscis brownish, the membranous labella more than half the length of the proboscis.

Mesonotum dull yellowish brown with a sparse vestiture of yellowish hairs but no distinct stripes. Scutellum concolorous. Pleura, sternum and coxae greyish pollinose and sparsely white haired. Legs pale brown or yellowish, the tarsi dusky. Femora pale haired, tibiae and tarsi dark haired. Wings with subepaulet, costa, subcosta and basal section of fifth vein with macrotrichia above, only costa and subcosta hairy beneath. Wings lightly fumose, all veins narrowly dark margined. No appendix on upper branch of third vein. Abdomen dirty yellowish brown, dark haired, and with three very faint stripes of paler hairs on the first to fifth tergites. Venter pale pinkish grey, immaculate. (1942c, p. 446)

Male. Not known.

Distribution. Panama to Ecuador. Colombia (Choco, Cauca).

Material examined. Panama, 17^{♂♂}. Ecuador, 1[♀]. Colombia: Choco; Curiche River, 4^{♂♂} May 1967, 3^{♂♂} June 1967, 2^{♂♂} Aug. 1967, 1[♀] 2 Oct. 1967, 1[♀] 26 Nov. 1967, D. G. Young coll; Cauca; Guapi, CO₂ baited flight trap, 14^{♂♂} 9 Feb. 1976.

Discussion. *T. nereus* is evidently a coastal species in Colombia, as it is in Panama.

Tabanus olivaceiventris Macquart

Tabanus olivaceiventris Macquart 1847, Dipt. Exot. Suppl. 2:18, ♂ ([♀]), Para, Brazil. Fairchild 1964, J. Med. Ent. 1(2):184-185, ♂, ♀, Panama, references; 1971, Cat. S. Amer. Dipt., Fasc. 28, p. 98, synonymy.

A large, robust pale green species with a parallel sided frons bearing a slender ridge like callus, legs indistinctly bicolored pale yellowish red and blackish, wings clear or with a brownish tint, and mesonotum with a small black spot just anterior to scutellum.

Female. (Colombian specimens) Length 16-18mm (N=4, \bar{x} =16.75mm). Frontal index 4.8-5.0 (\bar{x} =4.9), frons parallel sided. Frons yellowish brown pollinose with a grayish pollinose patch at the vertex; vestiture of numerous short black hairs except for short golden yellow hairs on the basal fourth and in a thin border along the sides reaching to the vertex. Callus a reddish brown slightly raised ridge about one-third as wide as frons, tapering gradually to a fine point about three-fourths the distance to the vertex. Eyes pale glaucous green in life. Subcallus and upper genae yellowish brown pollinose. Lower genae and frontoclypeus pale grayish yellow pollinose. Hairs of frontoclypeus and upper genae numerous, small, and yellowish except for a few short black hairs just below antennae. Beard is of numerous mostly short white hairs. Antennal segment 1 pale yellowish brown pollinose with black hairs above and pale yellow hairs below. Segment 2 black haired. Segment 3 with a reddish orange basal plate and contrasting black annuli; the dorsal tooth not long but with a distinct acute angle. Palpi not greatly inflated basally tapering gradually to a blunt tip. Vestiture a mixture of numerous short black and pale golden yellow hairs. Proboscis blackish brown pollinose, wholly fleshy except for small lateral subshiny areas.

Mesonotum and scutellum reddish brown in ground color but heavily steel gray pollinose with a mixture of quite numerous and short black and pale golden yellow hairs. Scutum just anterior to scutellum with a small thick patch of black hairs which are set off laterally by thick patches of pale yellow hairs. Pleura and coxae steel gray to pale grayish brown pollinose and pale yellow haired. Legs reddish brown, the tarsi dusky, the protarsi black. Femora with a pale bluish

pollinosity. Vestiture mostly pale yellow and black apically except for a patch of black hairs on the mesofemora and the metatibia which have orange red hairs. Wings clear or with a slight brownish hue.

Abdomen pale yellowish green in ground color and pollinosity. Vestiture above a mixture of short yellowish and black hairs; the black hairs most numerous on tergites 4-7. Laterally is a continuous patch of longer whitish hairs on tergites 1-4. Below vestiture is of numerous short pale yellow hairs.

Male. Fairchild states that the male is similar "in color, though the abdomen is densely white-haired on the first 4-5 segments. Antennae are more slender than in the female, palpi porrect, long oval, slightly falcate, orange pollinose and with mixed black and white hairs. Eyes are holoptic, bare, upper facets moderately enlarged, occupying about one-half of eye area, clearly demarcated from the small facets. There is a small tubercle sunk between the eyes at vertex" (1964, p. 185).

Distribution. Panama to Brazil, Trinidad. Colombia (Antioquia, Magdalena, Valle, Cauca).

Material examined. Panama, 1[♀]. British Guyana, 1[♀]. Surinam, 1[♀] 1[♂]. Venezuela, 1[♀]. Brazil, 6^{♀♀}. Colombia: Valle; Tenerife, 1[♀] Oct. 1971, Mejia Cardono coll; Palmira, 1[♂] Oct. 1970, G. Giraldo coll; Palmira, 1[♀] 15 March 1973, Marina-Juluia-Jose coll; Palmira, 1[♀] May 1962, P. L. Garcia coll; Yumbo, 1[♀] June 1965, Viafara coll; 1[♂] 18 April 1968, G. Villegas coll; Cauca; Puerto Tejada, biting cow, 1[♀] 8 April 1976, H. Rodriguez coll.

Discussion. Bequaert and Renjifo (1946) report this species from Magdalena, Rio Frio, and Porter (pers. comm. 1976) reports it from the Caucasia region of Antioquia.

Tabanus praeteritus Fairchild

Tabanus praeteritus Fairchild 1947, Ann. Ent. Soc. Amer., (1946), 39(4):570, 572, fig. 6, ♂, ♀, Panama; 1958, op. cit., 51(6):529-530.

A medium sized blackish brown species with a rounded rectangular pale brown callus extended above in a thin line, dorsal angle of antenna obtuse, legs bicolored blackish and pale reddish brown, thorax unstriped, wings with a slight brown hue, and abdomen with an integumental black triangle at least on tergites 1 and 2, often extended as a slender or stout, broken or continuous line onto 3 and subsequent segments. In addition the abdomen generally bears sublateral pale streaks or patches on tergites 1-5.

Female. The original description of Fairchild (1947) is here reprinted following these additional observations. Length 12-15mm (N=20, \bar{x} =13.25mm). Frontal index 4.4-5.6 (\bar{x} =4.9). Frons usually slightly convergent below, 0.75-1.0 (\bar{x} =0.85) times as wide as at vertex.

Eyes bare, in life dull green, unbanded. Frons about 4 1/2 times as high as basal width, slightly narrowed below, yellowish grey pollinose. Frontal callus yellowish brown, narrower than frons, higher than wide and prolonged in a short line above. Vertexal tubercle wholly absent. Subcallus, frontoclypeus and genae yellowish grey pollinose, with a fairly dense grey beard. Antennae orange yellow, the first segment somewhat inflated, the third with a fairly well-marked dorsal angle and the darker annulate portion somewhat shorter than the basal portion. Palpi pale yellowish, black haired, inflated basally but with a rather slender apex. Proboscis short, less than head height, the labelli membranous and over two-thirds length of proboscis.

Mesonotum dark grey, unstriped, with mixed dark and brassy hairs. Pleura and sternum steel grey, sparsely pale haired. Scutellum concolorous with mesonotum. Legs orange brown, the fore femora, apical halves of fore tibiae and bases of mid- and hind femora darker. Wings with subepaulet, costa, subcosta and first vein setose. All cells but anal open, no appendix on branch of third vein. Wings entirely hyaline except for the

yellowish stigma and faintly tinged costal cell. Abdomen mainly dull yellowish brown with, on the first two tergites, a narrow and not well defined inverted black triangle. The fourth and succeeding segments are darker in the middle, though there is no well defined stripe. The abdomen is mainly densely black haired, but with oval patches of yellow hairs dorsolaterally on the second to fifth tergites. On one specimen there is a very faint indication of a middorsal pale line. Sternites pale yellowish, wholly pale haired. (1947, p. 570)

Male. Fairchild states the following:

Eyes bare, holoptic, the facets hardly differentiated, those on the disk being very slightly larger than those on the margins. Vertexal tubercle present, small, densely haired. Coloration as in the female, but a little lighter in tone. (1946, p. 570, 572.)

Distribution. Costa Rica to Colombia (Valle, Cauca).

Material examined. Costa Rica, 1♂ 1♀. Panama, 5♀♀. Colombia: Valle; Rio Raposo, calf bait, 1♀ 21 May 1963, V. H. Lee coll; Cauca; Guapi, CO₂ baited flight trap, 64♀♀ 9 Feb. 1976, 24♀♀ 10 May 1976.

Discussion. These specimens agree with the typical form of the species taken on the Pacific side of the Isthmus of Panama, not with those from the Caribbean side reported by Fairchild (1958).

Tabanus pseudoculus Fairchild

Tabanus (Bellardia) pseudoculus Fairchild 1942, Psyche, 49(1-2): 13-14, figs. 1a, b, ♀, Panama.

Tabanus albocirculus: Dunn 1934, Psyche, 4(3):173-174, in part, not Mine, misident.

A medium to large pale reddish brown species with a small obtuse dorsal antennal angle, bluntly pointed palpi, bicolored pale reddish brown and black legs, a black spot anterior to and on the scutellum, wings fumose with a coarctate first posterior cell and long appendix at

fork of third vein, and abdomen with small middorsal hair triangles on tergites 1-5.

Female. The following information is in addition to the original description of Fairchild (1942) reprinted below. Length 13.5-16mm (N=11, \bar{x} =14.7mm). Frontal index 6.3-8.8 (\bar{x} =7.2). Frons convergent below, 0.63-0.93 (\bar{x} =0.77) times as wide as vertex. Basal callus rectangular but rounded, nearly touching sides of frons. Median callus a narrow ridge tapered at both ends. Antennal basal plate with a small obtuse dorsal angle. Palpi inflated basally, narrowing gradually to a point.

Eyes purple, with 2 narrow green bands and the lower margin narrowly green. Antennae wholly reddish yellow, the first two segments black haired. Frontal callus light reddish brown. Palpi whitish, with black and white hairs. Subcallus, fronto-clypeus and genae with greyish yellow pollen, the latter with a sparse whitish beard. Mesonotum brown, with grey pollinosity and sparse yellowish pubescence. Pleura grey, yellowish grey haired. Spot on scutellum covering prescutellum and disc of scutellum, completely encircled by yellowish white hairs. Legs light brown, mostly white haired, the apex of fore tibiae and all tarsi darker and black haired. The fore tibiae are not prominently bicolored. Wings hyaline, the veins sometimes narrowly brown margined. First posterior cell always narrowly open; appendix on third vein constant, generally longer than the distance from its origin to the furcation of the vein. Abdomen brown, greyish pollinose and black haired. The first to fifth tergites bear small median triangles of yellowish hairs. Venter lighter, wholly yellowish haired, except the last sternite which bears erect black hairs. (1942, pp. 13-14)

Male. Fairchild states:

Similar to the female in coloration. Large eye facets distinctly differentiated and demarcated from the small, occupying about half to two thirds of total eye area. Large facets pale tan, small facets purple, with a narrow band and the lower margin green in life. A small tubercle is present between the eyes at vertex. (1942, p. 14)

Distribution. Guatemala to Colombia, Venezuela, Trinidad.

Colombia (Choco, Valle).

Material examined. Panama, 8^{♂♂}. Venezuela, 3^{♂♂}. Trinidad, 2^{♂♂}.

Colombia: Choco; La Teresita, 1[♀] "12-4-67," D. G. Young coll;
La Teresita, 1[♀] 12 Nov. 1967; Curiche River, 1[♀] 9 July 1967; Valle;
Bajo Calima, 10km E Buenaventura, CO₂ baited flight trap, 1[♀] 5 Nov.
1975.

Tabanus pungens Wiedemann

Tabanus pungens Wiedemann 1828, Auss. zweifl. Ins. 1:175.

Fairchild 1971, Cat. S. A. Dipt. Fasc. 28, p. 100, synonymy. Goodwin
and Murdoch 1974, Ann. Ent. Soc. Amer., 67(1):124, figs. 19, 41.

Tabanus angustivitta: Fairchild 1942, Ann. Ent. Soc. Amer.,
35(2):165, pl. 1, fig. 7. 1942 op. cit. 35(1):88, seasonal distribution.

A small to medium brownish species with a wide frons bearing a
tubercle at the vertex and a swollen nearly square callus. Legs
indistinctly bicolored pale brown and blackish brown, wings hyaline,
and abdomen with a broad middorsal dark integumental stripe bearing a
narrow pale pollinose stripe and irregular sublateral pale yellowish
brown stripes.

Female. Length 9-11.5mm (N=20, \bar{x} =10.4mm). Frontal index 2.4-3.0
(\bar{x} =2.8). Frons nearly parallel sided, somewhat expanded in the middle.
Frons yellowish brown pollinose with sparse brown hairs. Ocellar
tubercle present but vestiges of ocelli not evident. Callus pale
yellowish brown to dark brown, nearly square, not touching sides of
frons. Eyes purple with two transverse green bands in life. Subcallus
pale grayish brown pollinose. Genae and frontoclypeus silvery gray

pollinose with numerous pale gray hairs. Antennal segment 1 somewhat swollen, pale yellowish brown pollinose and black haired. Segment 3 with a reddish brown basal plate and blackish brown annuli; dorsal angle obtuse. Palpi silvery white with a mixture of silvery and black hairs.

Mesonotum blackish brown in ground color covered with dark grayish brown pollinosity, a few black hairs and numerous shiny yellowish scale like hairs. Scutellum reddish brown. Pleura and coxae gray pollinose with numerous grayish white hairs. Femora pale yellowish brown with pale bluish pollinosity and white hairs. Protibiae indistinctly bi-colored, the basal three-fourths pale, as femora, the apex and protarsi blackish. Meso- and metatibiae pale yellowish brown, the tarsi and apices of tibiae dusky. Wings hyaline, venation normal, fork of third vein usually without an appendix.

Abdomen above with a narrow row of connected pale yellowish haired triangles forming a slender stripe on a broad irregular dark brown integumental stripe. Sublaterally are irregular pale yellowish brown stripes made up of a series of oblique marks. Below abdomen is pale yellowish brown with some bluish pruinosity and short pale yellow hairs.

Male. As female but much darker overall. Eyes holoptic with a prominent tubercle at vertex. Upper half to two-thirds made up of slightly enlarged facets, shiny black in life; the lower small facets purple with 2 green bands. Upper enlarged facets densely pubescent. Antennae as female. Palpi pale yellowish white, porrect, inflated and oval with a mixture of black and whitish hairs. Pleura, coxae, and femora charcoal gray. Dark middorsal abdominal stripe broader than in female.

Distribution. Neotropics except West Indies and Chile. Colombia (Valle, Cauca, Antioquia, Tolima, Amazonas, Cordoba, Meta).

Material examined. Honduras, 3♂♂ 1♀. Panama, 5♀♀ 2♂♂. Surinam, 2♀♀. Trinidad, 1♀. Venezuela, 1♀. Brazil, 3♀♀ 2♂♂. Ecuador, 1♂ 1♀. Peru, 1♀. Colombia: Valle; Municipio de Candelaria, NE of Cali, netted, livestock, and CO₂ baited and unbaited flight traps, numerous specimens in all months of the year; Cauca; "Finca Corredor," 40km S Cali, flight trap, 2♀♀ 21 Nov. 1974; Guapi; CO₂ baited flight trap, 7♀♀ 9 Feb. 1976; Amazonas; Santa Sophia Island, Rio Amazonas 30km W Leticia, 4♀♀ 27 July 1973; Cordoba; Monteria, 1♀ no date; Tolima; Venadillo, 1♀ 5 Jan. 1942, J. Rodriguez B. coll.

Discussion. Lee et al. (1969) report capturing 2 male *T. pungens*, one on the Rio Raposo, the other near Buenaventura.

Captures made from horses and in CO₂ baited flight traps at Candelaria near Cali yielded 42 and 159 specimens respectively. Most bit horses on the lower front legs (55%) or lower rear legs (24%). Peak activity was between 1300 and 1600hrs.

Bequaert and Renjifo (1946) report *T. pungens* (as *angustivitta*) from Meta, Villavicencio and Restrepo, and from Valle, Bugalagrande.

Tabanus rubripes Macquart

Tabanus rubripes Macquart 1838, Dipt. Exot., 1(1):134, ♀, Cayenne. Fairchild 1964, J. Med. Ent., 1(2):184-185, fig. 7, ♀, Paraguay, Brazil, Colombia, Panama; 1971, Cat. S. Amer. Dipt., Fasc. 28, p. 101, synonymy.

Tabanus lophus Philip 1960, Proc. Calif. Acad. Sci., (4), 31(31):92, ♀, Peru, ♂, Colombia, Santander.

Not reported from the study area although one specimen has been taken in Panama and others in Antioquia and east of the Andes in Colombia. I include description here in the key only.

Material examined. Panama, 1♀. Brazil, 12♀♀. Peru, 1♀. Paraguay, 1♀. Bolivia, 1♀. Colombia: Antioquia; Rio Anori Valley, La Tirana, 570m, 1♀ 31 May 1971, leg. C. H. Porter; Meta; Villavicencio, 2♀♀ no date; Villavicencio, 1♀ Sept. 1940, 1♀ 13 June 1944; Restrepo, 500m, 1♀ 1936.

Tabanus surifer Fairchild

Tabanus (Chelotabanus) surifer Fairchild 1964, J. Med. Ent. 1(2): 183-184. ♂, ♀, Panama, Colombia.

Tabanus thiemeans surifer Fairchild 1971, Cat. S. Amer. Dipt. Fasc. 28, pp. 102-103, synonymy.

Tabanus bigoti: Fairchild 1942, Ann. Ent. Soc. Amer., 35(4):442, figs. 5, 5a, 5b, ♀, in part, var. A.

The following is the original description of Fairchild.

Female. Length 18mm; wing 16mm. Eyes bare, in life dull bronzy, without bands. Frons about 8-9 times as high as basal width, nearly parallel sided, bright orange-brown pollinose. Frontal callus reddish orange, narrower than frons, about 3x as high as wide, with a median longitudinal groove, merging above into a slender raised ridge reaching nearly to vertex. Vertex without callus, with only a small denuded area. Subcallus, frontoclypeus and genae bright orange-brown pollinose, beard reddish brown. Antennae wholly bright reddish orange, the first 2 and dorsal spine of segment 3 with dark reddish brown to black hairs. Segment 3 with unusually long basal plate, well over 2x length of style, and with a slender but short basal spine arising close to its base, as figured by me in 1942. Palpi concolorous with frontoclypeus, basally inflated but with slender apex, beset with dark reddish brown to black hairs, about as long as antennal segment 3. Proboscis concolorous with face, slightly exceeding palpi, labella wholly membranous.

Mesonotum cinnamon brown, yellowish grey pollinose, with short erect black hairs and recumbent golden hairs mixed, essentially unstriped. Notopleural and pronotal lobes and sides of mesonotum more reddish in ground color, scutellum concolorous with mesonotum. Pleura brownish black, pollinosity yellowish grey above, becoming steel grey below. Hairs long and abundant, largely dark brown to black, but inconspicuous tufts of yellow hairs below and behind wing insertions.

Wings strongly brown tinged, color more intense in costal cell, anterior 1/3 of wing and along veins. Fork of 3rd vein with a long appendix, longer than short proximal segment of R 2+3. First posterior cell broadly open; anal cell closed far from wing margin. Halteres with brown stem and yellowish knob. Legs black and black-haired, coxae grey pollinose, hind tibiae with an outer posterior fringe of longer hairs, tarsi red-haired below.

Abdomen with segments 1-4 and anterior part of 5 bright reddish orange in ground color, remaining segments blackish. Red portions of dorsum, including a median patch on tergite 5, entirely clothed with coppery orange hairs, remainder of tergite 5 and tergites 6 & 7 black-haired. Beneath, sternites 1-4 orange and orange-haired, 5th to last black and black-haired. The name is from *L. surus*, a shoot or twig, in reference to the long appendix at fork of 3rd vein.

Male. Length 17mm; wing 13.5mm. Eyes bare, greenish bronze in life, holoptic, upper area of enlarged facets occupying about 1/2 eye area, well differentiated and demarcated from small facets. A small wedge-shaped tubercle sunk between eyes at vertex. Antennae as in ♀, but more slender, basal plate proportionally shorter, dorsal tooth shorter and more acute. Palpi bulbous, widest distally, with a small terminal nipple. Wings, legs, color and vestiture exactly as described for ♀.

(1964, pp. 183-184)

Distribution. Panama, Colombia (Choco, Antioquia, Boyaca, Valle, Cauca).

Material examined. Panama, 65^{♂♂} (includes 47 paratypes of *T. surifer*. Colombia: Choco; Rio Nimiquia, 3^{♂♂} 15 Aug. 1942, paratypes; 3^{♂♂} no other data, paratypes; La Teresita, 1[♂] 13 July 1967, 1[♀] 31 July 1967, D. G. Young coll; Curiche, 1[♀] 14 Oct. 1967, D. G. Young coll; between Rio San Juan and Baudo, CO₂ baited flight trap, 9^{♂♂} 23 Feb. 1976; Valle; Lower Anchicaya, netted and CO₂ baited and

unbaited flight traps, 3⁰⁰₊₊ 10 Aug. 1973, 3⁰⁰₊₊ 16 Aug. 1975, 7⁰⁰₊₊ Jan. 1975, 19⁰⁰₊₊ June 1975, 1⁰ 7 Nov. 1975, 4⁰⁰₊₊ 26 Jan. 1975, 8⁰⁰₊₊ 1⁰ 5 March 1976, 9⁰⁰₊₊ 2 April 1976; Lago Calima, from livestock, 1⁰ 8 Aug. 1975, 1⁰ 4 Sept. 1975, 6⁰⁰₊₊ Jan. 1976, 2⁰⁰₊₊ 9 Sept. 1976; Bajo Calima, netted and CO₂ baited flight traps, 27⁰⁰₊₊ 5 Sept. 1975; "Rio Bravo - Playa Rica," 10⁰⁰₊₊ 17 Jan. 1976, 10⁰⁰₊₊ 3 Feb. 1976, 12⁰⁰₊₊ 26 March 1976; Rio Zabaletas, 4km E Zabaletas, netted or CO₂ baited flight traps, 2⁰⁰₊₊ July 1975, 4⁰⁰₊₊ 18 Aug. 1975, 8⁰⁰₊₊ 19 Oct. 1975; Ladrilleros, 30km N Buenaventura, netted, 1⁰ 23 Jan. 1975; vicinity Buenaventura, CO₂ baited and unbaited flight traps, 2⁰⁰₊₊ 12 Aug. 1973, 5⁰⁰₊₊ 5 July 1975, 2⁰⁰₊₊ 22 Nov. 1975, 10⁰⁰₊₊ 19 March 1976; Rio Raposo, 1⁰ 2 July 1963; Cauca; Guapi, CO₂ baited flight trap, 3⁰⁰₊₊ 9 Feb. 1976, 28⁰⁰₊₊ 10 Oct. 1976.

Discussion. Fairchild states the following concerning the paratypes:

Paratypes vary somewhat, as follows. Size ranges from a wing length of 12-17mm, body and head length from 14-19mm. Color of frons and face ranges to dark cinnamon brown, beard almost black, proboscis blackish, and callus dark brown. Mesonotum and scutellum range to almost black, rarely with faint indications of stripes. Pleura may be largely black haired, subalar tufts orange brown. In old faded specimens tibiae may be somewhat reddish and hairs on legs dark red rather than black. Some specimens have small tufts of yellowish hairs on dorsal sides of last 2 pairs of femora at base. Abdomen may have more or less black hair on anterior tergites, especially dorsolaterally, but centers and lateral and posterior margins always orange-haired. Tergite 5 may occasionally lack pale hairs. Tooth on dorsal side of antennal segment 3 sometimes shorter and broader than in figure, rarely slightly longer. Figure given in 1942 was drawn from a paratype from El Valle, 13. IV. 1941, now much denuded. (1964, p. 183)

Lec et al. (1969) report collections of *T. surifer* in the Rio Raposo, Rio Micay, and Buenaventura areas from human bait, livestock, and one specimen was taken 12m in the forest canopy.

Among the paratypes listed by Fairchild (1964) are 11 captured at 0600hrs 9 July 1949 on the Rio Cana Panama, and one from Boyaca, Muzo, 900m, 1936, J. Bequaert coll. This last specimen is the only *surifer* seen from east of the Andes, and is slightly different from specimens west of the Andes. Its true status will need study of additional material.

T. surifer is quite similar to *T. thiemeana* (Enderlein). The two may be distinguished, however, by the following characters. *Surifer* has a reddish brown basal plate of the antenna with a short antennal tooth rather than a black basal plate with a long dorsal spine. Frontal indices of Colombian specimens overlap but indicate two taxa. *T. surifer* ranges from 6.7 to 10.0 (N=20, \bar{x} =8.0, 1SD=0.84) and *T. thiemeana* ranges from 5.0 to 7.6 (N=22, \bar{x} =6.1, 1SD=0.62). While the vestiture of the abdomen of *T. surifer* is as above, *T. thiemeana* dorsally has short black hairs and a faint median stripe of orange hairs. Ventrally most hairs are black except for orange hairs on the apical borders. Rather than dark coppery eyes those of *thiemeana* are a very dark green.

T. bigoti Bellardi may be distinguished from the above two by its lack of an appendix at the fork of the third vein, narrower frons and more slender black callus, and gray to yellow, not brown, facial pollinosity.

Porter (pers. comm. 1978) reports *surifer* from the Providencia region of Antioquia.

I have not seen typical *bigoti* from Colombia, though 2 specimens from Muzo, Boyaca, are very similar, one of these being labeled as agreeing with the type of *Ommallia brevipennis* Enderlein, as species considered merely a variant of *bigoti* by Fairchild (1966a).

Tabanus thiemeana (Enderlein)

Ommallia thiemeana Enderlein 1925, Mitt. Zool. Mus. Berlin,
11(2):389, Colombia, Cordillera, tierra caliente.

Ommallia interrupta Enderlein 1925, Mitt. Zool. Mus. Berlin,
11(2):391, Colombia.

Tabanus thiemeana: Fairchild 1971, Cat. S. Amer. Dipt., Fasc.
28, pp. 102-103, synonymy.

A medium to large reddish brown species with a long antennal tooth,
black legs, smoky brown wings with a long appendix at fork of third
vein, and abdomen above with a broad faint orange haired stripe.

Female. *T. thiemeana* is quite similar to *T. surifer* Fairchild.
Refer to that section for the description of *surifer* and a discussion
of the differences between these two and *T. bigoti* Bellardi. It may
be distinguished from *T. macquarti* by the characters used in the key.

Male. Easily associated with female. Eyes contiguous, all facets
uniformly small. Ocellar tubercle at vertex distinct. Antennae with
a long antennal tooth as female but more slender. Palpi porrect, egg
shaped, pale grayish brown, covered with brownish hairs. Abdomen above
mostly with numerous short black hairs except for a few golden yellow
hairs laterally and on the middorsal apical margins of tergites 1-5.
Vestiture of wholly dark hairs below.

Distribution. Ecuador, Colombia (Choco, Valle).

Material examined. Ecuador, 7^{♂♂} (including 1 compared to type of
Ommallia thiemeana Enderlein by C. B. Philip in 1954 and 1 compared to
type of *Ommallia interrupta* by G. B. Fairchild. Colombia: Choco;
between Rio San Juan and Rio Baudo, CO₂ baited flight trap, 16^{♂♂}
23 Feb. 1976; Valle; Lago Calima, 8km below dam, from livestock,

netted, and CO₂ baited and unbaited flight traps, 73⁰⁰♂ July 1975, 24⁰⁰♂ 8 Aug. 1975, 36⁰⁰♂ 4 Sept. 1975, 24⁰⁰♂ 24 Oct. 1975, 24⁰⁰♂ 21 Nov. 1975, 9⁰⁰♂ Jan. 1976, 24⁰⁰♂ 13 Feb. 1976, 21⁰⁰♂ March 1976, 74⁰⁰♂ April 1976; "Rio Bravo - Playa Rica," ?km below dam Lago Calima, from livestock, 11⁰⁰♂ 26 March 1975, 9⁰⁰♂ 17 Jan. 1976, 74⁰⁰♂ 3 Feb. 1976, 14⁰♀ 9 April 1976; Rio Zabaletas, netted and CO₂ baited and unbaited flight trap, 24⁰⁰♂ 3 June 1975, 34⁰⁰♂ July 1975, 54⁰⁰♂ 18 Aug. 1975, 14⁰♀ 19 Oct. 1975; 41km E Buenaventura, flight trap, 64⁰⁰♂ 22 Nov. 1975, 74⁰⁰♂ 5 Dec. 1975, 174⁰⁰♂ 19 March 1976; Lower Anchicaya, netted and CO₂ baited and unbaited flight traps, 54⁰⁰♂ 28 Jan. 1975, 134⁰⁰♂ June 1975, 24⁰⁰♂ 16 Aug. 1975, 24⁰⁰♂ 26 June 1976, 314⁰⁰♂ 5 March 1976, 124⁰⁰♂ 2 April 1976; 3.6km W. Queremal, 1300m, CO₂ baited flight trap, 14⁰♀ 14 Feb. 1976; Rio Raposo, light trap, 14♂ 10 Feb. 1965, V. Lee coll. All specimens seen have been from west of the Andes.

Tabanus unipunctatus (Bigot)

Atylotus unipunctatus Bigot 1892, Mem. Soc. Zool. France, 5:663, ♀, Amer. meridional.

Tabanus unipunctatus: Kertész 1900, Cat. Tab. Orb. Terr. Univ. p. 76. Fairchild 1971, Cat. S. Amer. Dipt. Fasc. 28, pp. 103-104, synonymy.

Tabanus fumomarginatus: Dunn 1934, Psyche, 41(3):174, ♀, Panama. Not Hine 1920, misident.

Tabanus piraticus Fairchild 1942, Psyche, 49(102):15-16, figs. 7, a, b, ♀, Panama; 1953, Proc. Ent. Soc. Washington 55(5):241.

A medium sized dull reddish brown species with a long slender black third antennal segment, indistinctly bicolored pale reddish brown

and dark brown legs, wings with diffuse brownish vein margins, posterior mesonotum and scutellum with a small black spot outlined by a few golden yellow hairs, and abdomen reddish brown with a faint middorsal dull yellowish stripe.

Female. The original description of Fairchild (as *piraticus*) is reprinted below following these additional observations. Length 12-14mm (N=10, \bar{x} =13.2mm). Frontal index 6.0-8.0 (\bar{x} =6.7). Callus reddish brown, broad below, nearly touching sides of frons, tapering gradually to a point about two-thirds distance to vertex. Basal plate of third antennal segment elongate, the dorsal angle obtuse. Palpi somewhat swollen basally, otherwise slender and bluntly pointed.

Frons and face dull yellowish brown, beard sparse, brownish. Callus orange yellow. First two antennal segments yellow, black haired, the third nearly black. Palpi dull brownish yellow, black haired. Proboscis blackish, the labellae fleshy, more than half total length of proboscis. Eyes bare, dark greenish black, unicolorous in life.

Mesonotum orange brown, sparsely brown haired. Pleura and coxae somewhat more greyish. Prescutellum and disc of scutellum with a prominent large spot of black pilosity, completely encircled with pale golden hairs. Legs light brown, dark haired, the fore femora, tibiae and tarsi darker; the tibiae not bicolored. Wings quite smoky, either rather uniformly so, or with the veins broadly brown margined. First posterior cell broadly open and no vestige of an appendix on the third vein. Abdomen orange brown in ground color, clothed with dark and light brown hairs, the latter forming an exceedingly faint, broad mid-dorsal stripe or series of broad connected triangles, which are only visible in perfect specimens with light of proper incidence. Beneath, the abdomen is somewhat lighter with sparse light hairs. (1942, p. 15)

Male. Quite similar to female. Eyes contiguous, uniformly dark bronze, the upper half to two-thirds with larger facets well demarcated from the small ones below. There is a small tubercle sunk between the eyes at the vertex. Antennae as female, those of the

specimen from Rio Tacarcuna wholly pale reddish brown. Palpi brownish, slightly pointed, porrect, with long dark brown hairs.

Distribution. Mexico to Colombia (Choco, Valle).

Material examined. Mexico, 6^{♂♂}. Costa Rica, 3^{♂♂}. Nicaragua, 2^{♂♂}. Panama, 8^{♂♂} 2^{♂♂}. Colombia: Choco; Alto Curiche, "B-1037," 1[♂], D. G. Young coll; Valle; Rio Raposo, 1[♂] 30 Jan. 1963, C. J. Marinkelle coll.

Tabanus unistriatus Hine

Tabanus unistriatus Hine 1906, Ohio Nat., 7(2):28. Fairchild 1942, Ann. Ent. Soc. Amer., 35(2):162, pl. 1, fig. 2, references; 1976, Studia Ent., 19(1-4):240, 242, 260-261, fig. 15.

A small blackish species, the orange antennae with contrasting black annuli, bare subcallus, bicolored pale yellowish and black legs, fumose wings, and abdomen black with a single pale median stripe.

Female. Length 8.0-9.5mm (N=20, \bar{x} =8.75mm). Frontal index 7.7-11.8 (\bar{x} =9.2). Frons convergent below, 0.4-0.7 (\bar{x} =0.55) times as wide as vertex. Frons pale yellowish brown pollinose, sparser at the vertex, with a distinct median brown pollinose area. Vestiture of short black hairs. Basal callus blackish, rectangular, touching sides of frons; median callus a distinct narrow ridge reaching about half distance to vertex. Eyes in life deep purple with three equal iridescent green bands, the top two narrowly joined at their outer ends. Subcallus bare, shiny dark reddish brown. Genae and frontoclypeus silvery gray pollinose with sparse pale gray hairs. Antennal segments 1 and 2 pale yellowish brown and black haired; segment 3 with an orange basal plate, the dorsal angle obtuse and the annuli contrastingly

black. Palpi pale grayish brown pollinose with short black hairs except for pale silvery hairs basally.

Mesonotum and scutellum black with dark brown pollinosity, erect black hairs and recumbent greenish scale like hairs. The greenish hairs sometimes form 2 faint dorsolateral stripes. Pleura and coxae grayish pollinose with sparse pale hairs. Legs dark brown except basal halves of all tibiae which are pale to dark yellow, the protibiae clothed with silvery white hairs, the meso- and metatibiae with pale yellowish brown hairs. Wings fumose, darker costally.

Abdomen dark brown above, and black haired, the first two segments sometimes brownish laterally. Middorsal stripe pale yellow pollinose with some white hairs, nearly parallel sided but tapering slightly towards posterior end. Faint indications of dorsolateral stripes are sometimes evident on first few segments. Abdomen below dark blackish brown, bluish gray pruinose, and pale silvery white haired.

Male. The male is similar to female, except that abdomen is brown, mid stripe more yellowish, and with, in some specimens, more definite traces of lateral stripes. The eyes are bare, with the area of large facets extensive, about $2/3$ eye area, the large facets well differentiated and demarcated from the small. There is no tubercle at vertex, and the frontal triangle is darkened, subshiny, although the subcallus is pollinose. Palpi porrect, long oval, not mammillate, with mixed dark and light hairs. (Fairchild 1976, p. 260)

Distribution. Guatemala to Ecuador. Colombia (Choco, Valle, Cauca).

Material examined. Guatemala, 1 σ . Nicaragua, 4 σ . Honduras, 4 σ . Costa Rica, 3 σ . Panama, 21 σ 3 σ . Ecuador, 2 σ . Colombia: Choco; between Rio San Juan and Rio Baudo, netted and CO₂ baited flight trap, 3 σ 23 Feb. 1976; Valle; Rio Raposo, 1 σ 7 April 1964,

Barreto coll; 25km E Buenaventura, flight trap, 1♀ 12 Aug. 1973, Wilkerson and Young coll; 41km E 20km N Buenaventura, CO₂ baited flight trap, 5♀♀ 19 March 1976, 4♀♀ 22 Nov. 1975; Lower Anchicaya, netted and CO₂ baited and unbaited flight traps, 1♀ 10 Aug. 1973, 4♀♀ 28 Jan. 1975, 9♀♀ April 1975, 5♀♀ 16 Aug. 1975, 3♀♀ 26 Jan. 1976, 2♀♀ 5 March 1976, 7♀♀ 2 April 1976; Rio Zabaletas, netted, CO₂ baited and unbaited flight traps, 7♀♀ 2-5 July 1975, 4♀♀ 18 Aug. 1975, 1♀ 19 Oct. 1975; Cauca; Guapi, netted and CO₂ baited flight trap, 3♀♀ 9 Feb. 1976, 10♀♀ 10 May 1976.

Discussion. Lee et al. (1969) captured *T. unistriatus* in the Rio Raposo and Rio Micay areas, mostly from human bait.

Tabanus sp.

There remain 4 specimens keyed at couplet 11 which cannot yet be identified. They bear the following information. Colombia: Boyaca; Muzo, alt. 900m, 2♀♀ 1936, J. Bequaert coll; Choco; La Teresita, 1♀ 9 April 1967, D. G. Young coll; Antioquia; 25km S, 22km W Zaragoza, 1♀ 28 Jan. 1971, C. H. Porter coll. Structurally all specimens are quite similar, but they differ among themselves in color. Lack of series of specimens and defective state of some of the specimens make description seem premature.

Figure 1

Esenbeckia tigrina n. sp., A. Frons, B. Antenna, C. Palp, D. Head side view.

Esenbeckia minuscula n. sp., E. Head side view, F. Frons, G. Antenna, H. Palp.

Esenbeckia chagresensis, I. Tip of proboscis.

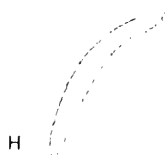
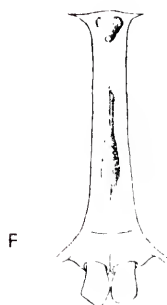
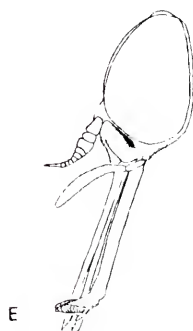
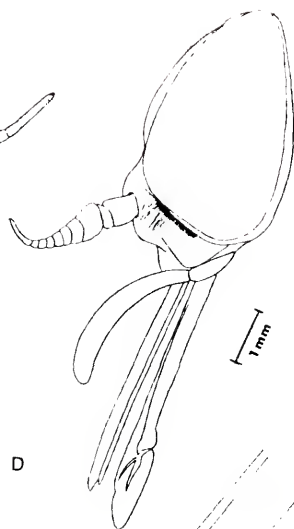
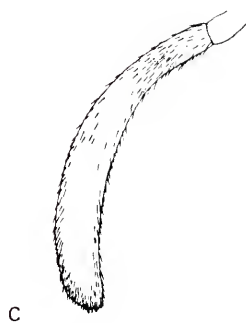
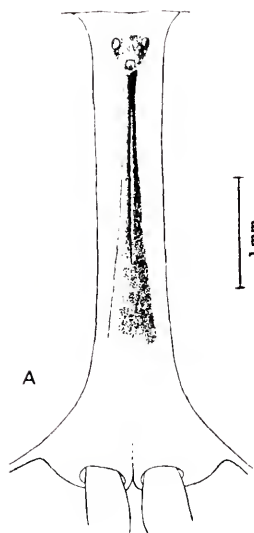


Figure 2

Esenbeckia balteata n. sp., A. Frons, B. Antenna, C. Palp, D. Head side view.

Esenbeckia testaceiventris (Macquart), E. Frons, F. Antenna, G. Palp, H. Head side view.

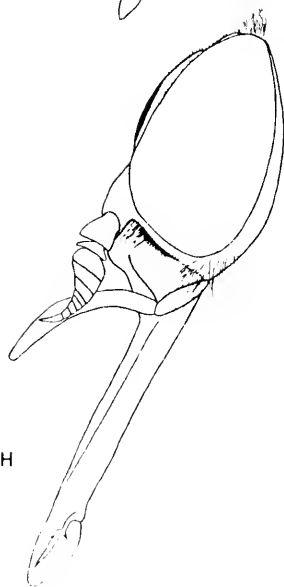
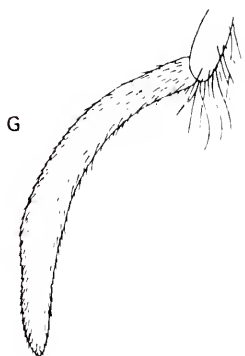
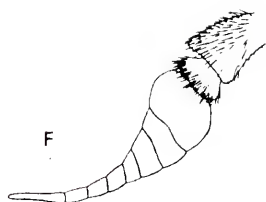
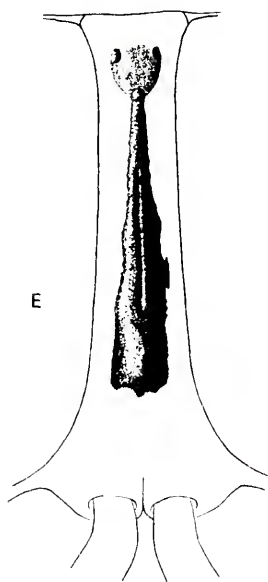
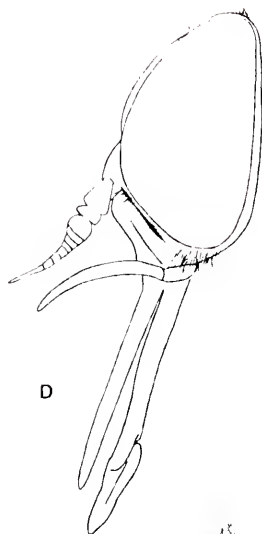
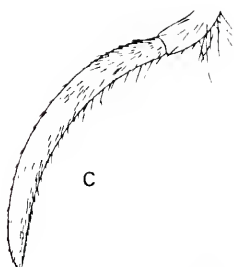
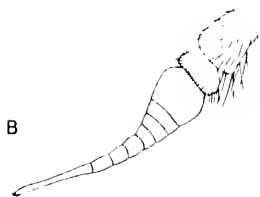
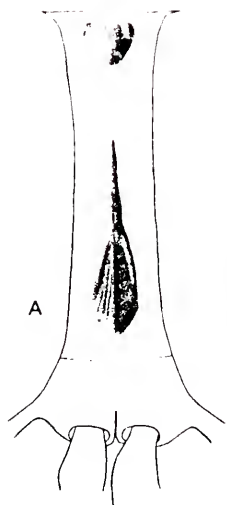


Figure 3

Fidena sulfurea n. sp., A. Frons, B. Antenna, C. Palp, D. Head side view.

Scione cuprous n. sp., E. Antenna, F. Frons, G. Head side view, H. Palp.

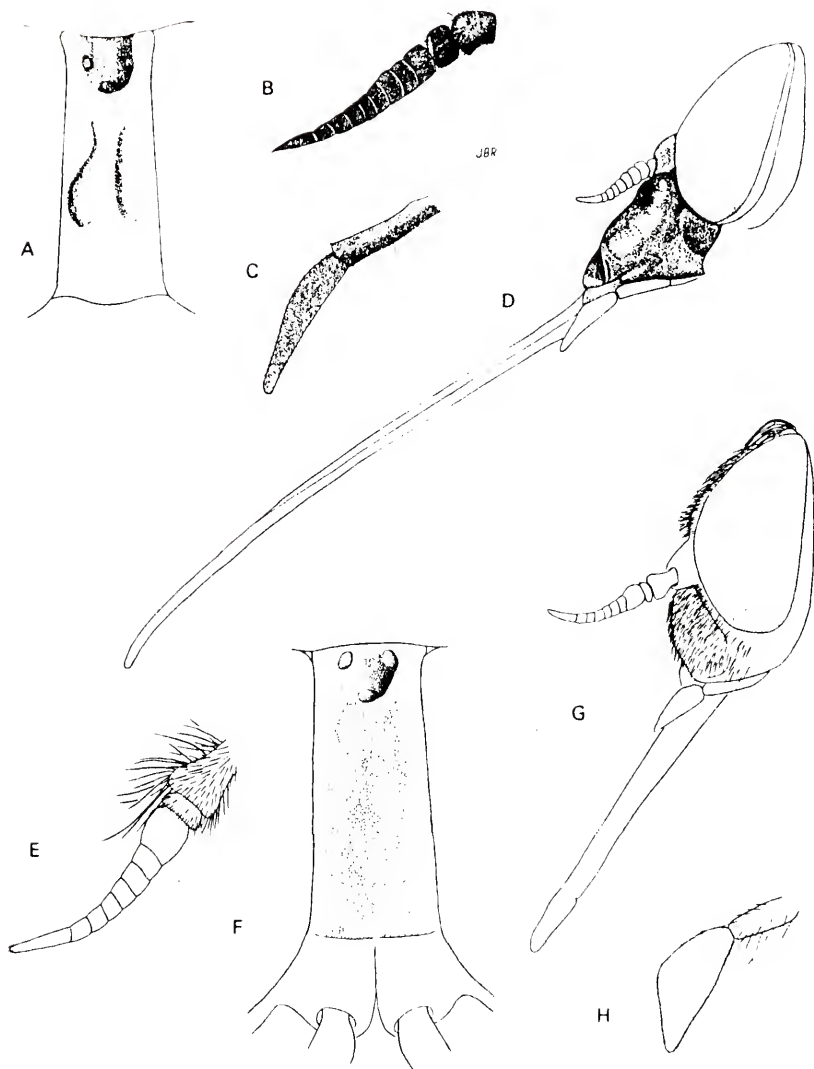


Figure 4

Scione youngi n. sp., A. Head side view, B. Frons, C. Antenna,
D. Palp.

Scione rhinothrix n. sp., E. Antenna, F. Head side view, G. Palp,
H. Frons.

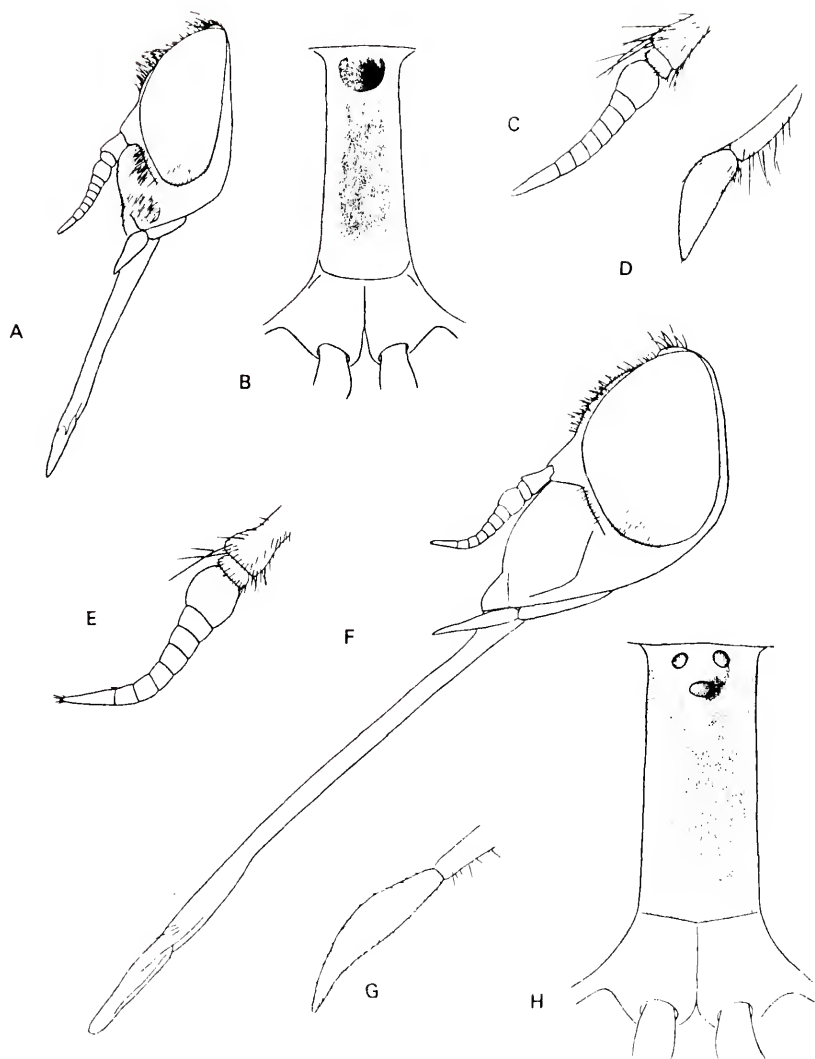


Figure 5

Scione albifasciata (Macquart), A. Frons, B. Antenna, C. Palp,
D. Head side view.

Scione flavescens (Enderlein), E. Frons, F. Palp, G. Antenna,
H. Head side view.

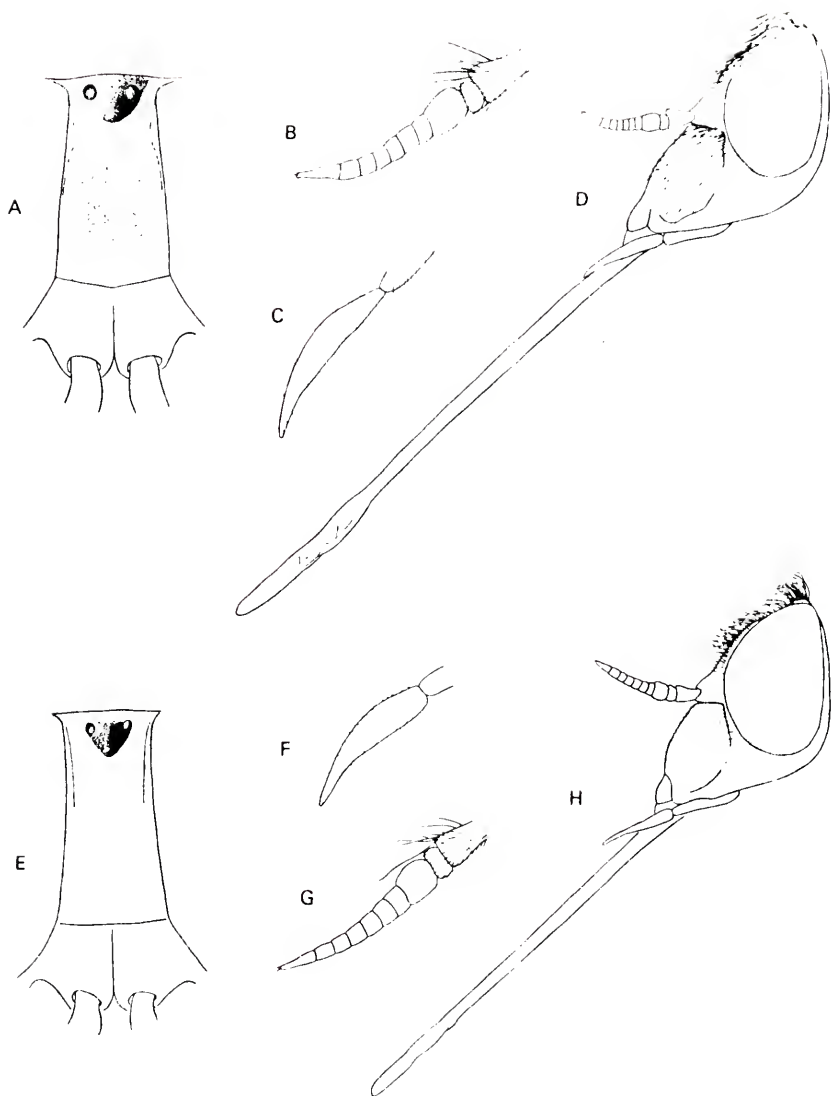


Figure 6

Scione serratus n. sp., A. Frons, B. Antenna, C. Palp, D. Head side view.

Scione obscurefemorata Krober, E. Frons, F. Antenna, G. Palp, H. Head side view.

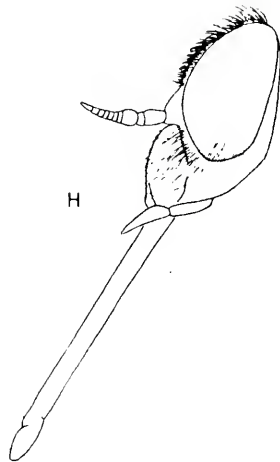
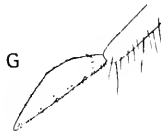
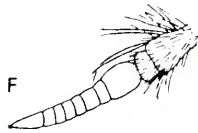
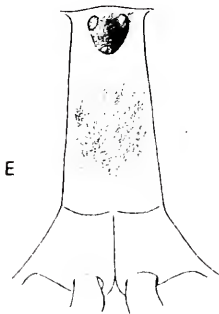
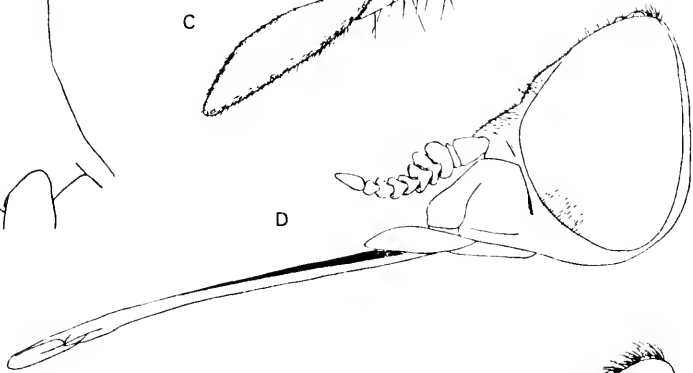
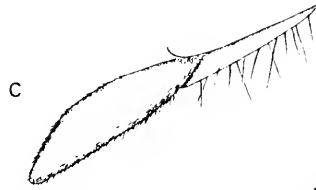
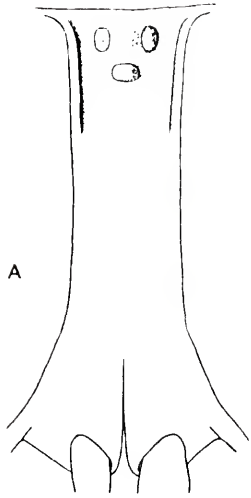


Figure 7

Scione equivesans n. sp., A. Frons, B. Antenna, C. Palp, D. Head side view.

Scione brevibecus n. sp., E. Frons, F. Antenna, G. Head side view, H. Palp, I. Palp of holotype.

Chrysops reticulatus n. sp., J. Frons, K. Antenna, L. Palp.

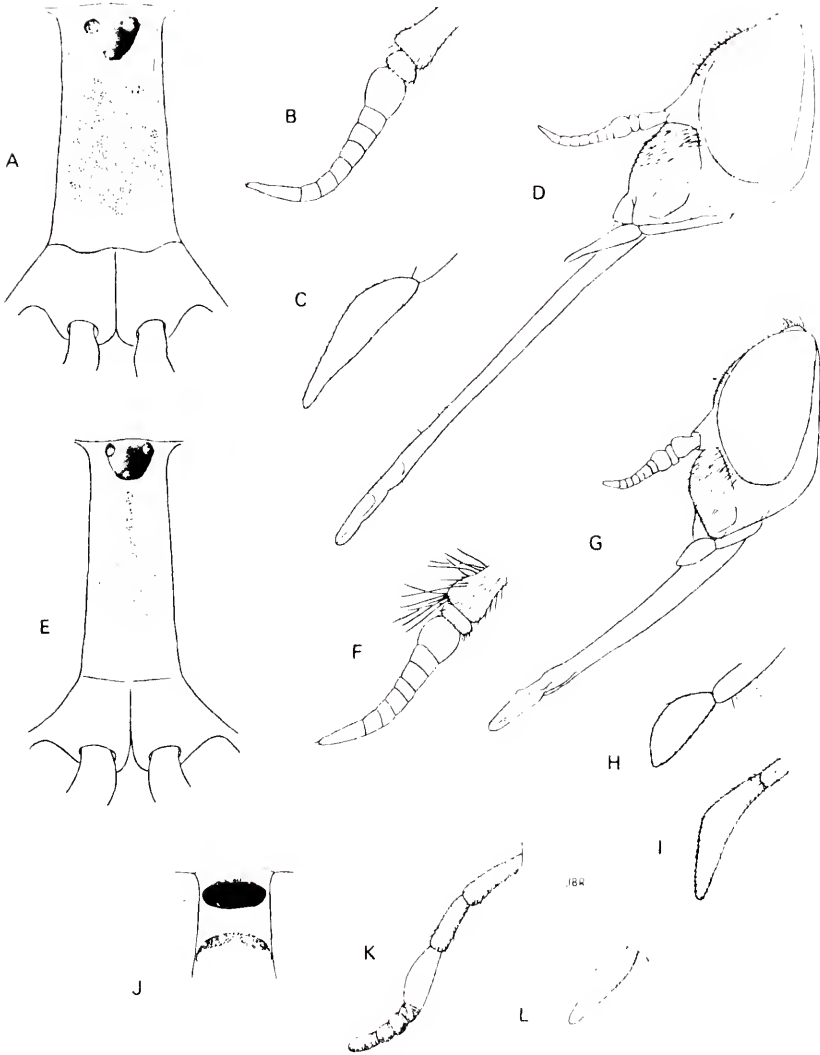


Figure 8

Stenotabanus chrysonotus, A. Antenna, B. Palp, C. Frons.

Stenotabanus nigriculus n. sp., D. Antenna, E. Palp, F. Frons.

Stenotabanus brunneus n. sp., G. Antenna, H. Palp, I. Frons.

Stenotabanus roxannae n. sp., J. Antenna, K. Palp, L. Frons.

Stenotabanus luteolineatus n. sp., M. Antenna, N. Palp, O. Frons.

Philipotabanus tanypterus n. sp., P. Antenna, Q. Palp, R. Frons.

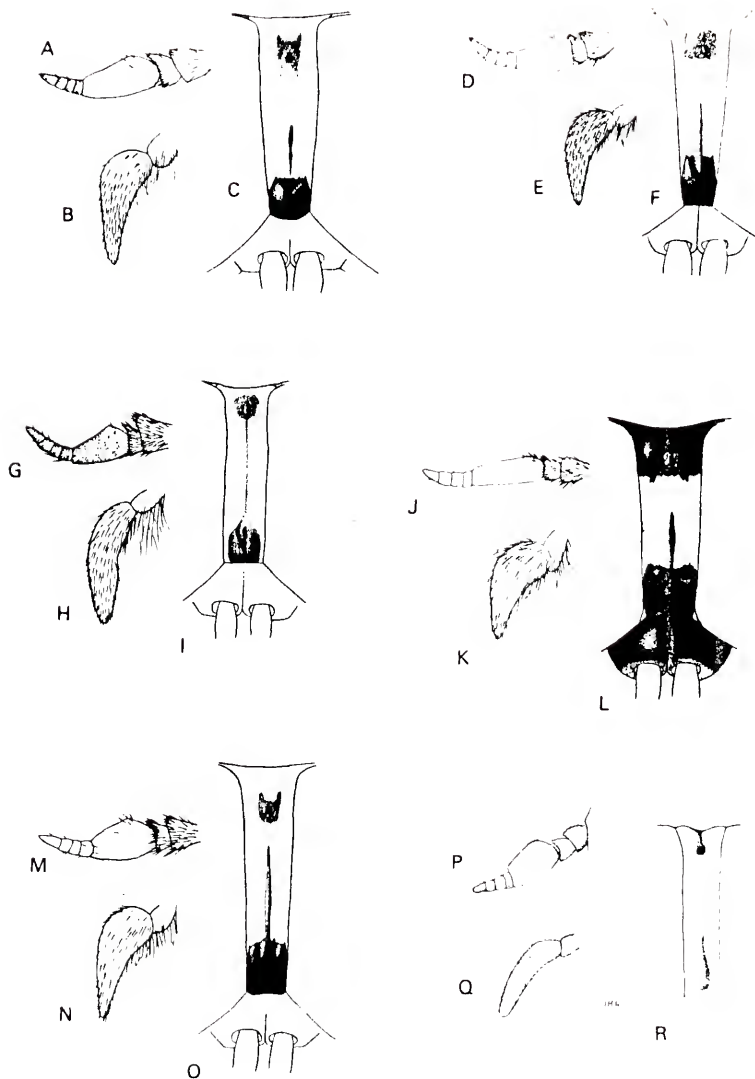


Figure 9

Chlorotabanus fairchildi n. sp., A. Antenna, B. Palp, C. Frons.

Spilotabanus triaurius n. sp., D. Antenna, E. Palp, F. Frons.

Dichelacera curvata n. sp., G. Antenna, H. Palp, I. Frons.

Catachlorops siculus n. sp., J. Antenna, K. Palp, L. Frons.

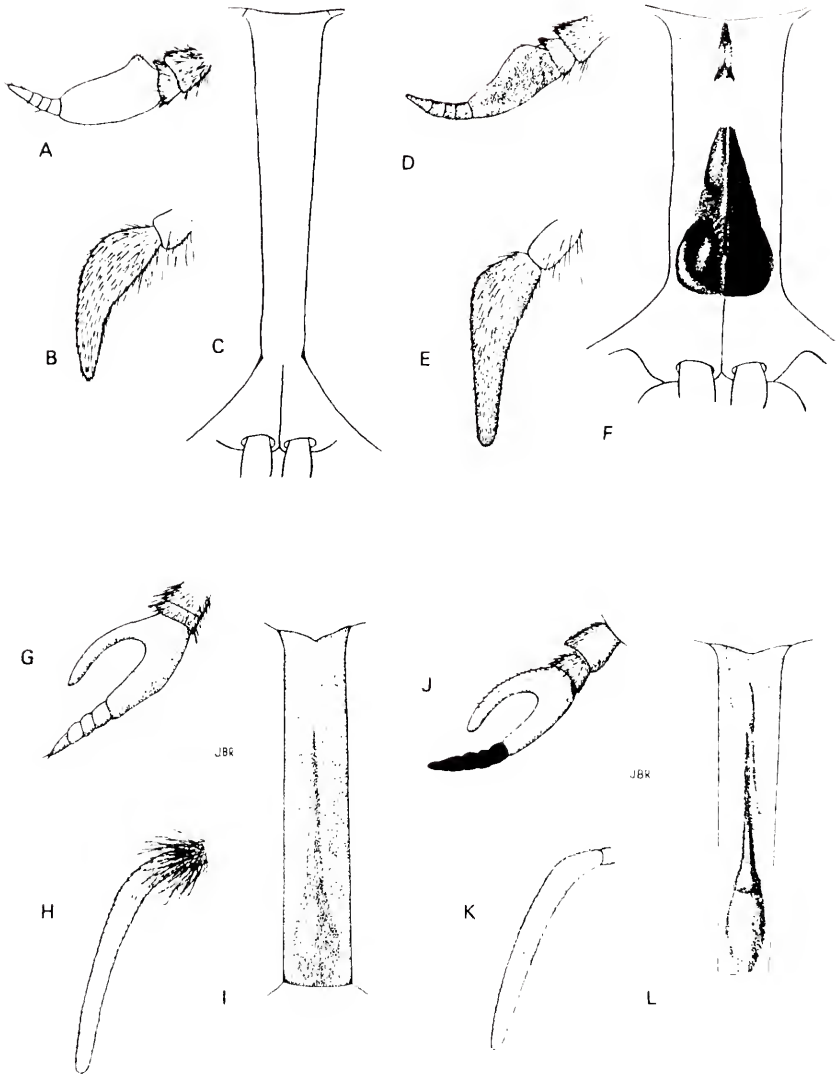


Figure 10

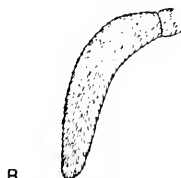
Catachlorops alphas n. sp., A. Antenna, B. Palp, C. Frons.

Dicladocera basirufa (Walker), D. Male antenna, E. Male palp.

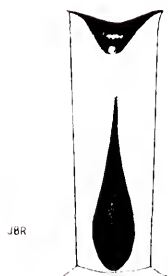
Dicladocera argentomacula n. sp., F. Male antenna, G. Female antenna,
H. Male palp, I. Female palp, J. Frons.



A



B



JBR

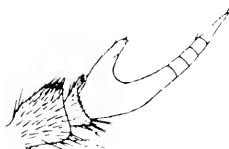
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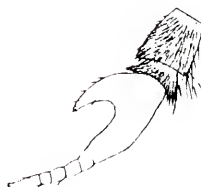
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E



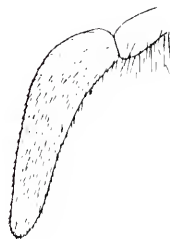
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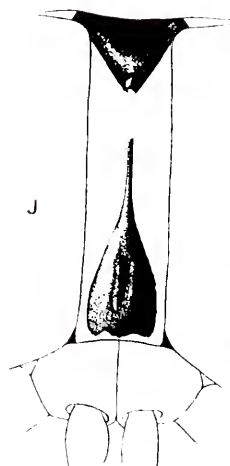
G



H



I



J

Figure 11

Di cladocera leei Fairchild n. sp., A. Female antenna, B. Male antenna,
C. Palp, D. Frons.

Di cladocera calimaensis n. sp., E. Antenna, F. Palp, G. Frons.

Di cladocera hirsuta n. sp., H. Antenna, I. Palp, J. Frons.

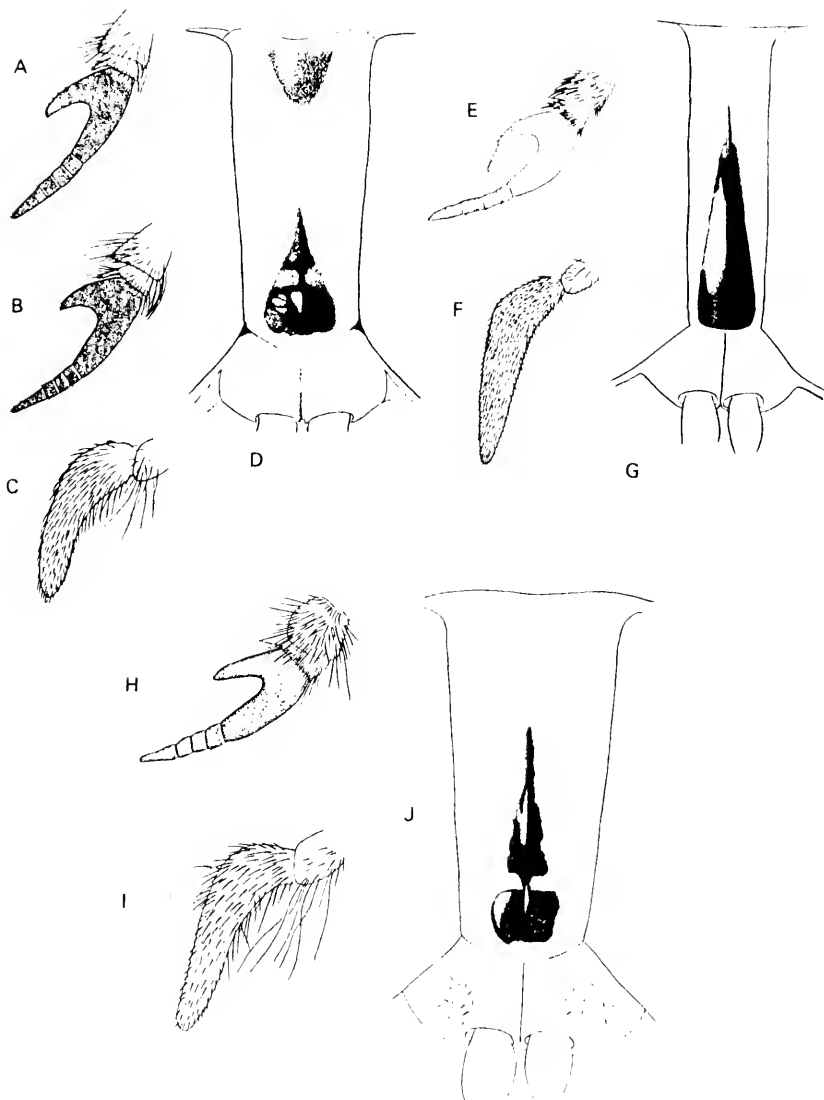


Figure 12

Dicladocera beaveri n. sp., A. Antenna, B. Palp, C. Frons.

Dicladocera pruinosa n. sp., D. Antenna, E. Palp, F. Frons.

Dicladocera dalessandroi n. sp., G. Antenna, H. Palp, I. Frons.

Dicladocera distomacula n. sp., J. Antenna, K. Palp, L. Frons.

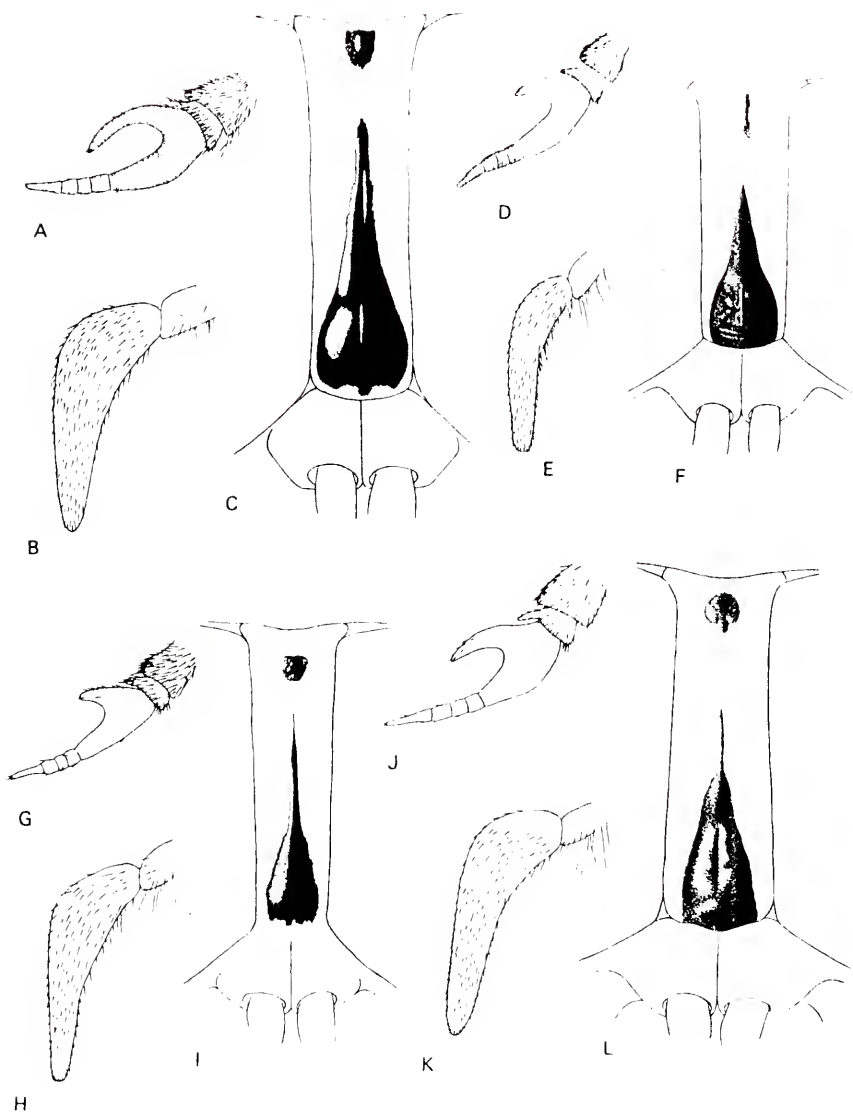


Figure 13

Dicladocera minos (Schiner), A. Antenna, B. Palp, C. Frons.

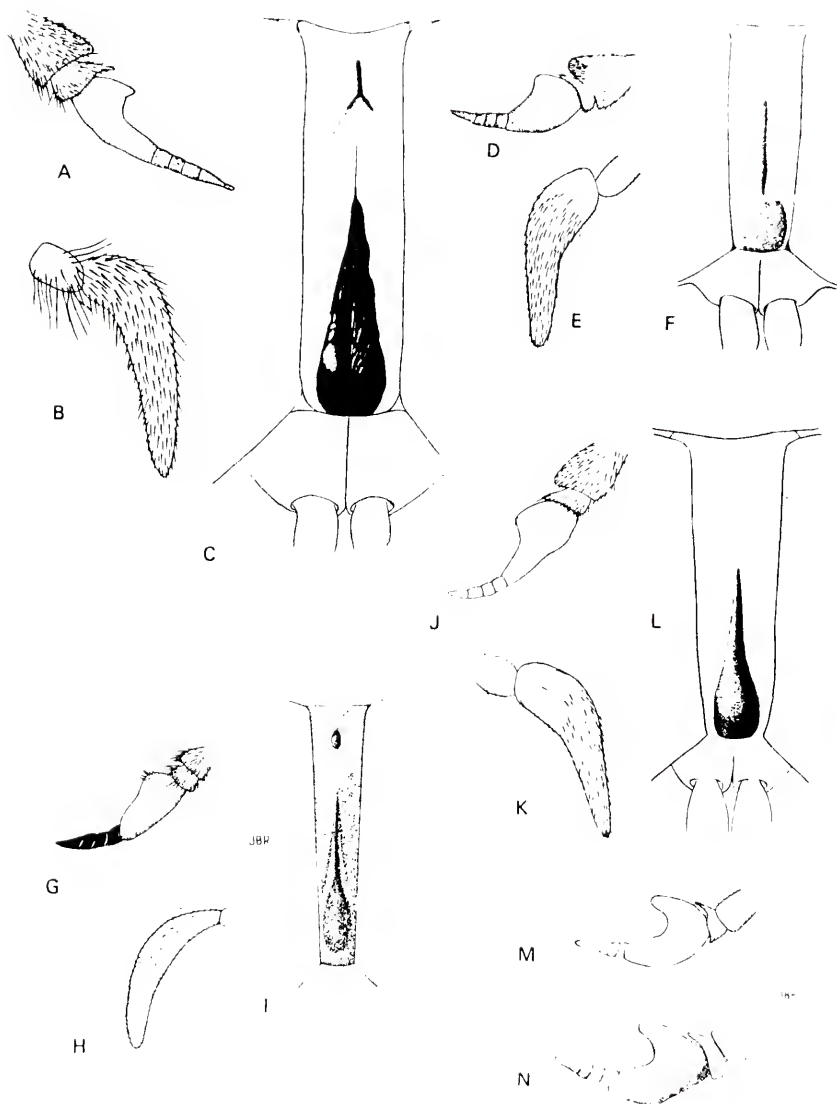
Poeciloderus allusiosis n. sp., D. Antenna, E. Palp, F. Frons.

Stypommisa n. sp., G. Antenna, H. Palp, I. Frons.

Tabanus guapiensis n. sp., J. Antenna, K. Palp, L. Frons

Cryptotylus chloroticus (Philip and Fairchild), M. Antenna.

Cryptotylus unicolor (Wiedemann), N. Antenna.



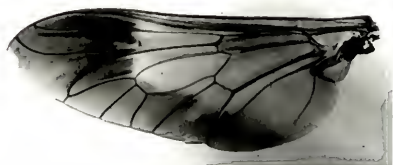


Fig. 14. *Esenbeckia tinctipennis*

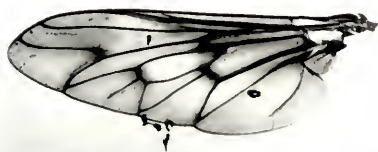


Fig. 19. *Scione youngi*



Fig. 15. *Scione cupreus*

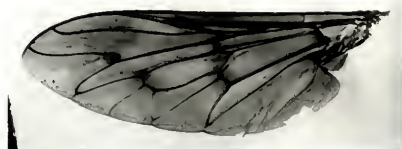


Fig. 20. *Scione rhinothrix*

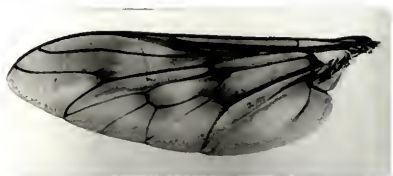


Fig. 16. *Scione flavescens*

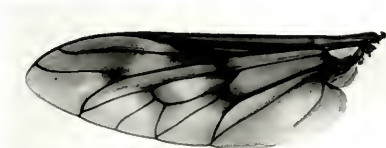


Fig. 21. *Scione albifasciata*

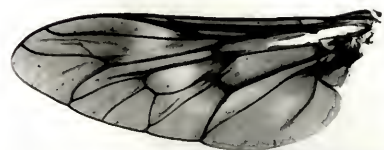


Fig. 17. *Scione equivexans*

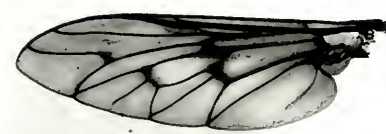


Fig. 22. *Scione obscurefemorata*

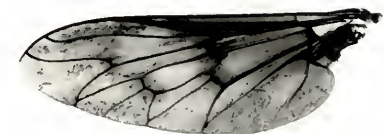


Fig. 18. *Scione maculipennis*

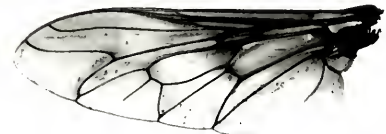


Fig. 23. *Scione brevibeccus*



Fig. 24. *Chrysops nexosus*

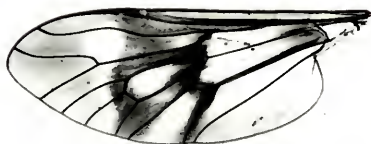


Fig. 29. *Chrysops variegatus*

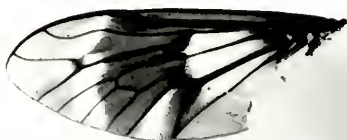


Fig. 25. *Chrysops calogaster*

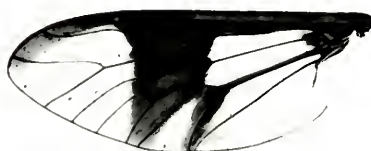


Fig. 30. *Chrysops varians*
var. *tardus*

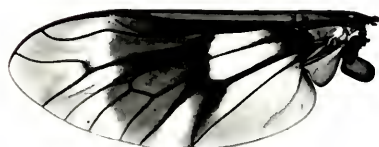


Fig. 26. *Chrysops soror*



Fig. 31. *Chrysops auroguttatus*

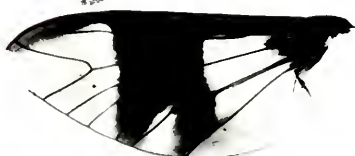


Fig. 27. *Chrysops melaenus*

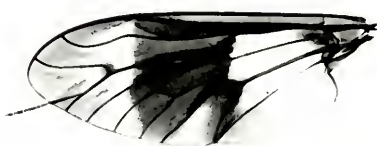


Fig. 32. *Chrysops mexicanus*

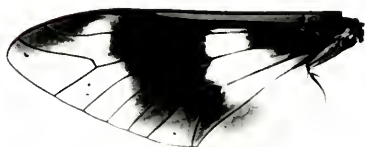


Fig. 28. *Chrysops chiriquensis*



Fig. 33. *Chrysops reticulatus*



Fig. 34. *Chrysops leucospilus*



Fig. 39. *Seltasoma tibiale*

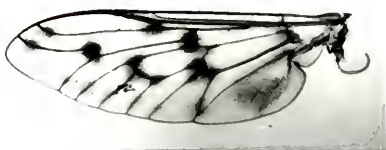


Fig. 35. *Dasybasis schineri*

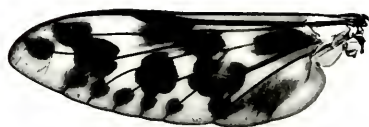


Fig. 40. *Spilotabanus multiguttatus*



Fig. 36. *Dasybasis montium*

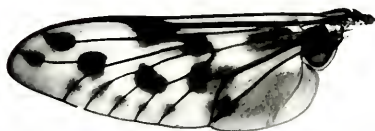


Fig. 41. *Spilotabanus triaureus*

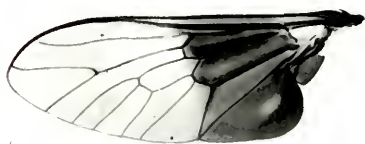


Fig. 37. *Himantostylus intermedius*



Fig. 42. *Dichelacera fasciata*



Fig. 38. *Hemichrysops fascipennis*



Fig. 43. *Dichelacera melanosoma*

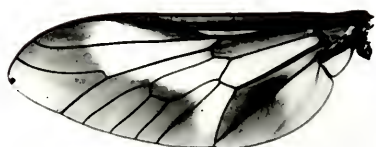


Fig. 44. *Dichelacera regina*

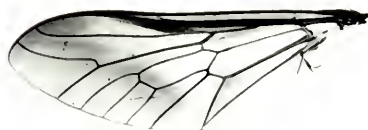


Fig. 49. *Dichelacera marginata*



Fig. 45. *Dichelacera transposita*

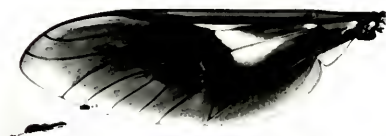


Fig. 50. *Dichelacera albomarginata*



Fig. 46. *Dichelacera subcallosa*



Fig. 51. *Dichelacera aurata*

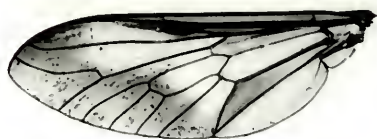


Fig. 47. *Dichelacera chocoensis*

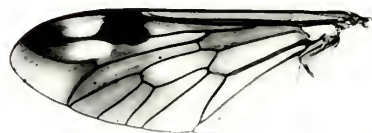


Fig. 52. *Catachlorops fulmineus*
form *ocellatus*

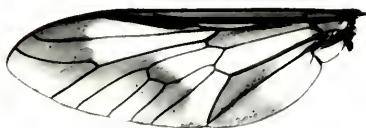


Fig. 48. *Dichelacera submarginata*

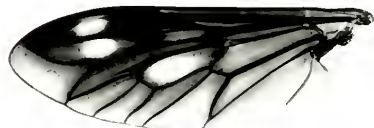


Fig. 53. *Catachlorops fulmineus*



Fig. 54. *Catachlorops flavissimus*

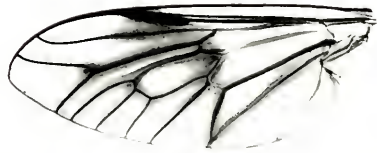


Fig. 59. *Dicladocera dalessandroi*

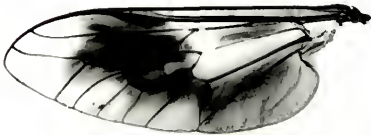


Fig. 55. *Catachlorops alphas*

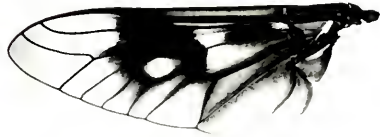


Fig. 60. *Dicladocera riveti*

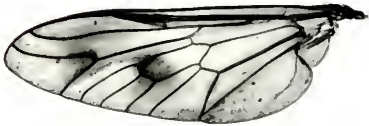


Fig. 56. *Catachlorops siculus*

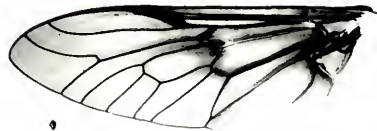


Fig. 61. *Dicladocera beaveri*

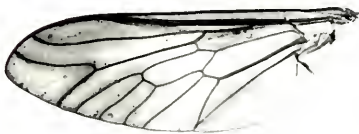


Fig. 57. *Catachlorops vespertinus*

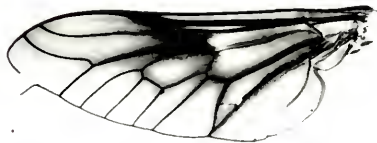


Fig. 62. *Dicladocera hirsuta*

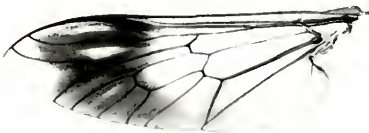


Fig. 58. *Catachlorops umbratus*



Fig. 63. *Dicladocera distomacula*

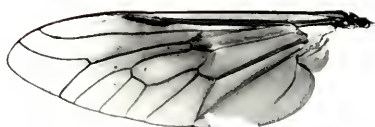


Fig. 64. *Dicladocera distomacula*

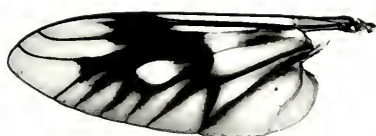


Fig. 69. *Dicladocera argentomacula*

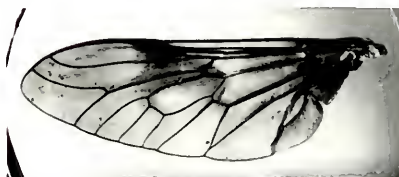


Fig. 65. *Dicladocera macula*

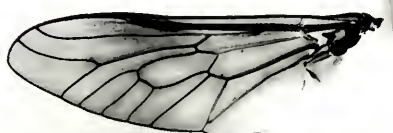


Fig. 70. *Dicladocera rubiginipennis*

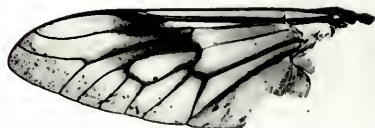


Fig. 66. *Dicladocera submacula*

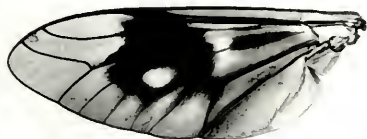


Fig. 71. *Dicladocera pruinosa*

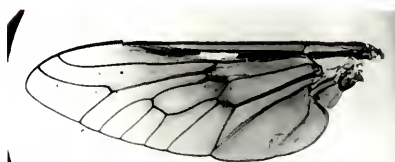


Fig. 67. *Dicladocera basirufa*

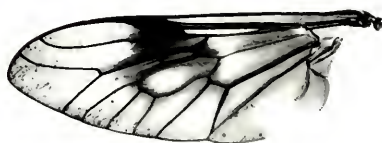


Fig. 72. *Dicladocera calimaensis*

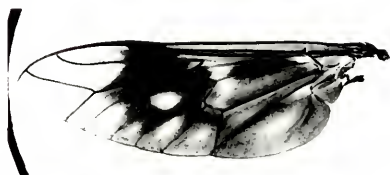


Fig. 68. *Dicladocera minos*

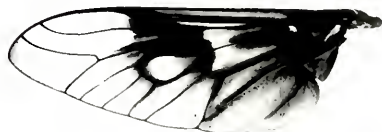


Fig. 73. *Dicladocera nigrocoerulea*

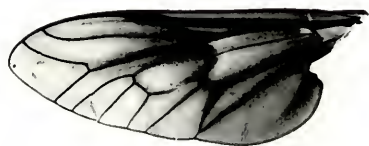


Fig. 74. *Dieladocera leei*

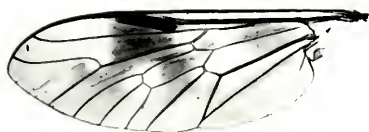


Fig. 79. *Ph. pterographicus*



Fig. 75. *Stibasoma apicimacula*

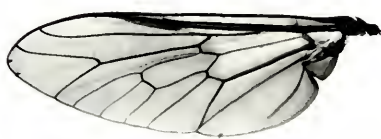


Fig. 80. *Philipotabanus porteri*

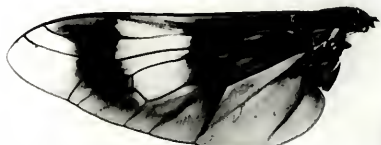


Fig. 76. *Stibasoma chionostigma*

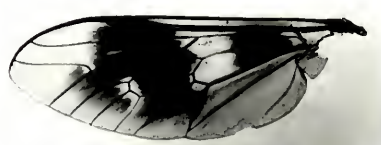


Fig. 81. *Ph. nigrinubilis*

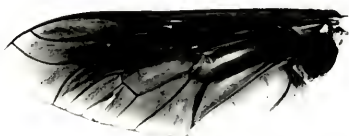


Fig. 77. *Stibasoma panamensis*

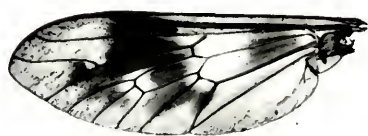


Fig. 82. *Ph. magnificus*

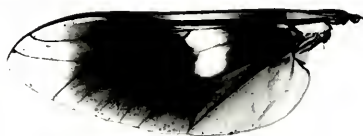


Fig. 78. *Philipotabanus fascipennis*

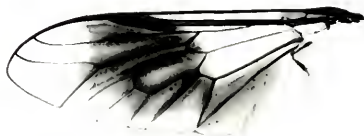


Fig. 83. *Ph. vulpinus*

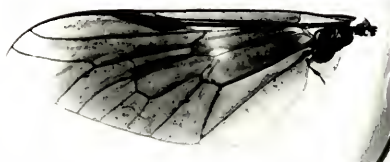


Fig. 84. *Philipotabanus nigripennis*



Fig. 89. *Stypommisa pequeniensis*
Anchicaya

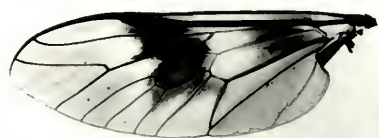


Fig. 85. *Philipotabanus criton*

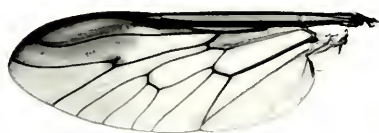


Fig. 90. *Stypommisa pequeniensis*
Buenaventura

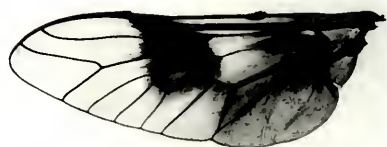


Fig. 86. *Ph. phaleropygus*

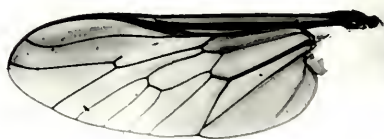


Fig. 91. *Stypommisa captiroptera*

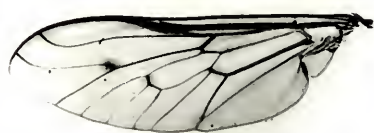


Fig. 87. *Stypommisa jaculatrix*



Fig. 92. *Lepiselaga crassipes*
Guapi



Fig. 88. *Stypommisa marucii*



Fig. 93. *Lepiselaga crassipes*
Candelaria

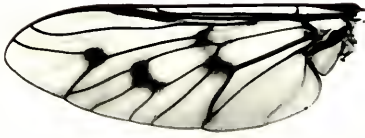


Fig. 94. *Poeciloderus quadripunctatus*

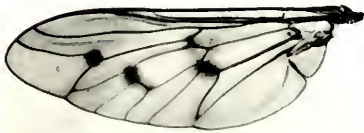


Fig. 95. *Poeciloderus allusiosus*



Fig. 96. *Tabanus guapiensis*

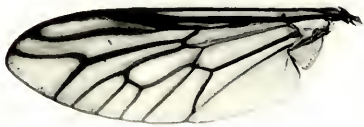


Fig. 97. *Tabanus eldridgei*

Figure 98

Map of Colombia. Shaded sections represent areas more than 1000m above sea level.

Legend

- 1 Atlantico Dept.
- 2 Magdalena Dept.
- 3 Norte de Santander Dept.
- 4 Caldas Dept.
- 5 Risaralda Dept.
- 6 Quindio Dept.
- 7 Cundinamarca Dept.

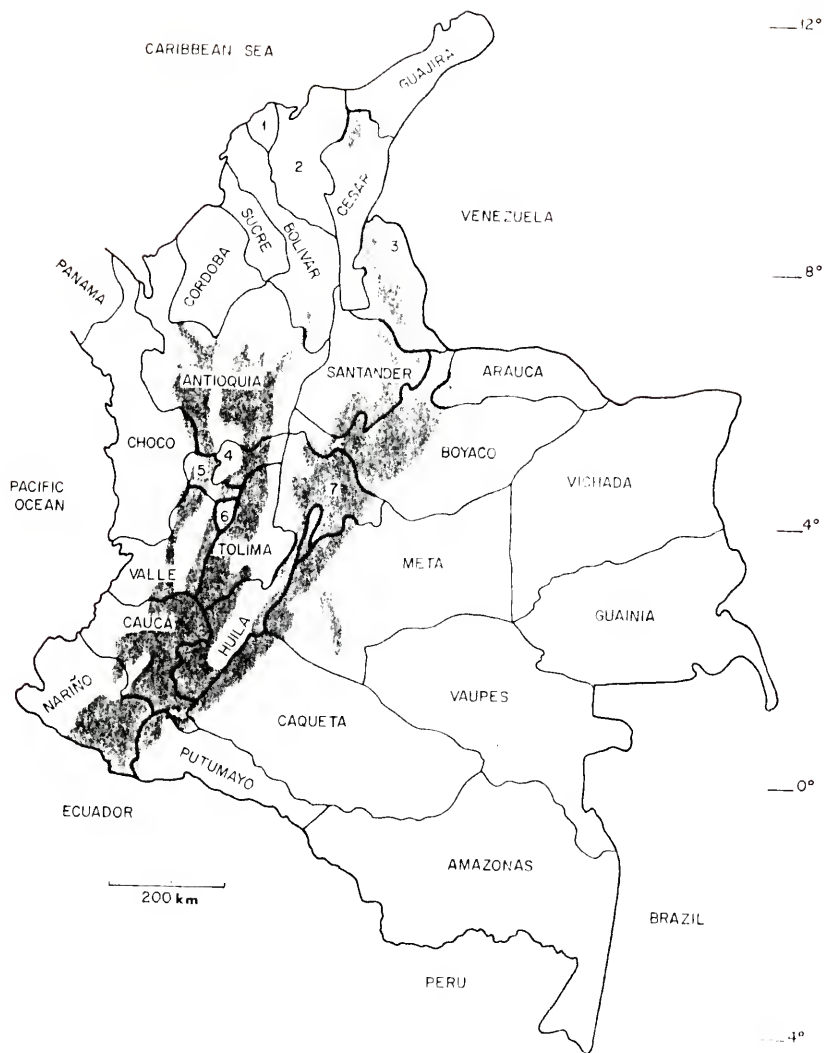


Figure 99

Holdridge life zone map of the Department of Choco. Numbers correspond to collecting localities listed in the text beginning on page 9.

Figure 100

Holdridge life zone map of the Department of Valle. See figure 99 for legend. Numbers correspond to collecting localities listed in the text beginning on page 9.

DEPARTAMENTO DEL VALLE

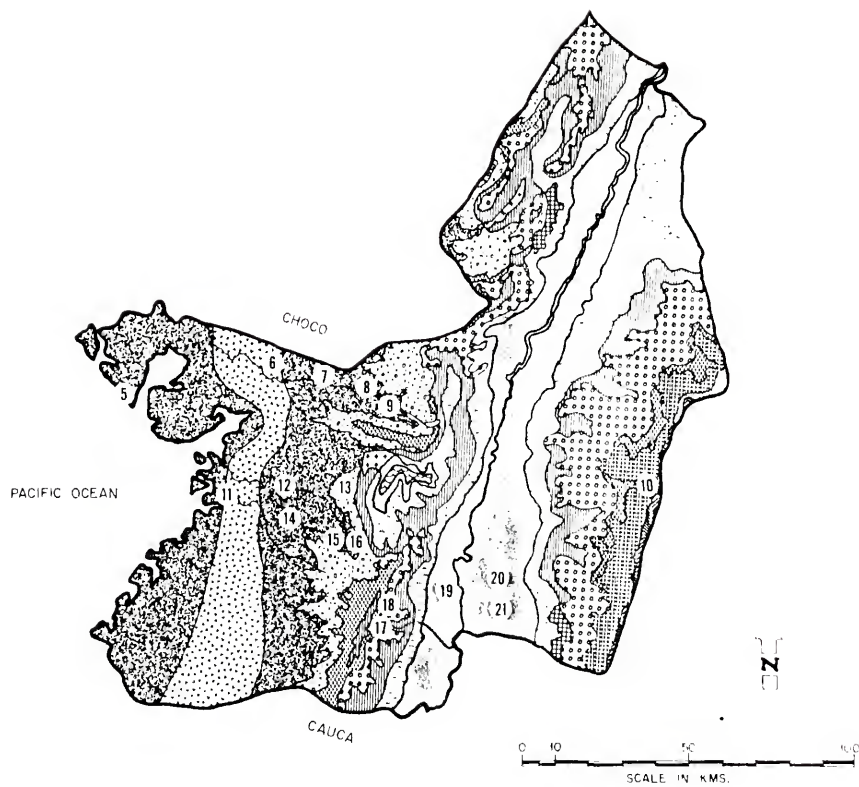


Figure 101

Holdridge life zone map of the Department of Cauca. See figure 99 for legend. Numbers correspond to collecting localities listed in the text beginning on page 9.

DEPARTAMENTO DEL CAUCA

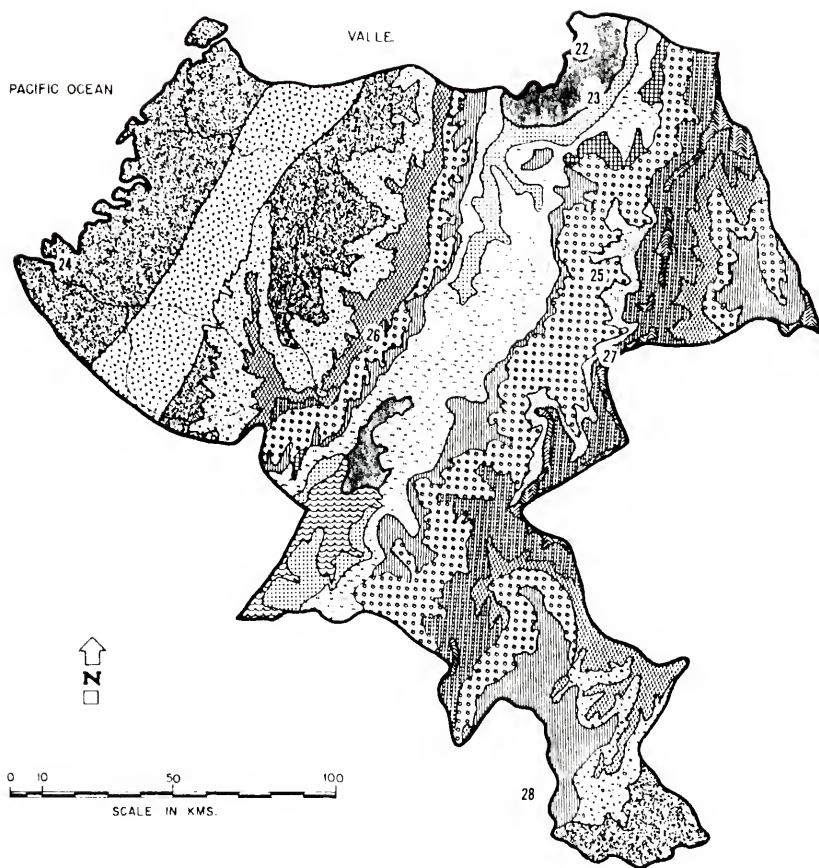
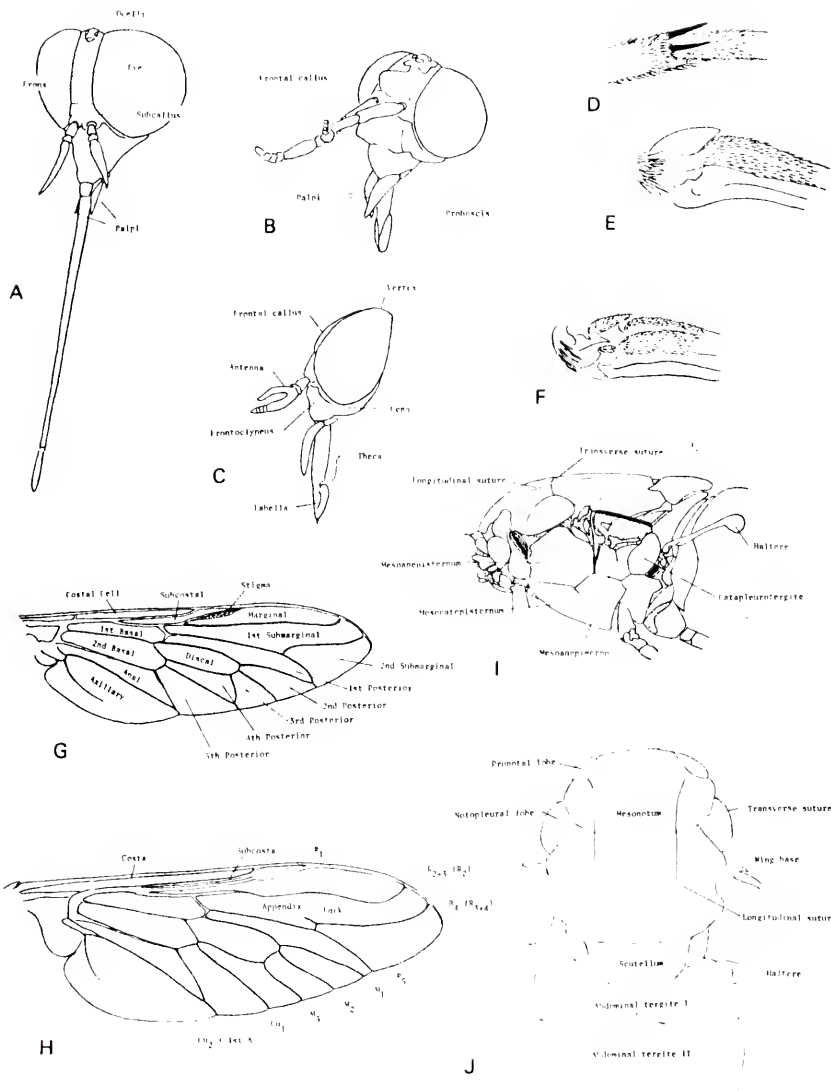


Figure 102

General horse fly morphology. A. Head, *Fidena auribarba*. B. Head, *Chrysops variegata*. C. Head, side view, *Dasychela badia*. D. Apex of hind tibia of *Fidena flavipennis* showing paired tibial spurs. E. Base of wing of *Fidena flavipennis* showing bare basicosta and setose base of costal vein. F. Base of wing of *Tabanus nebulosus* showing setose basicosta and base of costal vein. G. Wing of *Scione costaricana* with the cells labeled according to Curran as explained in the text. Note the closed and petiolate first and fourth posterior cells and anal cell. H. Wing of *Tabanus pseudoculus* with the veins named according to Comstock-Needham as explained in the text. Note the appendix of fork of third vein and coarctate first posterior cell. I. Side view of thorax of *Poeciloderus quadripunctatus*. J. Dorsal view of thorax and first 2 abdominal segments of *Tabanus nebulosus*.

↑



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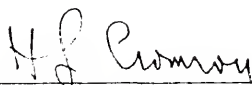
BIOGRAPHICAL SKETCH

Richard C. Wilkerson was born January 25, 1946, in Rock Hill, South Carolina. He graduated from South Mecklenburg High School in Charlotte, North Carolina, in 1964 and began his undergraduate work at the University of North Carolina at Chapel Hill that same year. He received the Bachelor of Arts degree with a major in botany at the University of North Carolina in 1968.

Mr. Wilkerson's graduate studies began at the University of Florida in 1968. His studies were supported by a National Defense Education Act Fellowship from 1968 to 1969. In 1969 he was inducted into the United States Army where he served as an instructor in preventive medicine, specializing in medical entomology at the Medical Field Service School, Enlisted Subjects Branch, Fort Sam Houston, Texas. He resumed his graduate work in January, 1972, and held a National Institute of Health Traineeship in parasitology until 1974. From 1974 to 1976 he worked as a predoctoral researcher in Cali, Colombia, at the International Center for Medical Research of Tulane University.


Mr. Wilkerson is presently a research associate, funded by a grant from the National Science Foundation to study Colombian horse flies.

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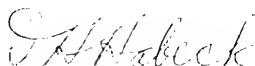
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Professor of Entomology and
Nematology

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Dr. G.B. Fairchild, Co-Chairman
Professor of Entomology and
Nematology

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Dr. D.H. Habeck
Professor Entomology and
Nematology

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Dr. S.G. Zam
Associate Professor of Microbiology
and Cell Science

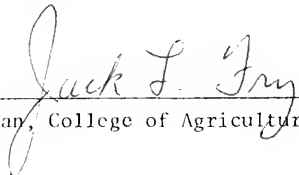
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Dr. J.F. Butler
Associate Professor of Entomology and
Nematology

This dissertation was submitted to the Graduate Faculty of the College of Agriculture and to the Graduate Council, and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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Dean, College of Agriculture

Dean, Graduate School

UNIVERSITY OF FLORIDA



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